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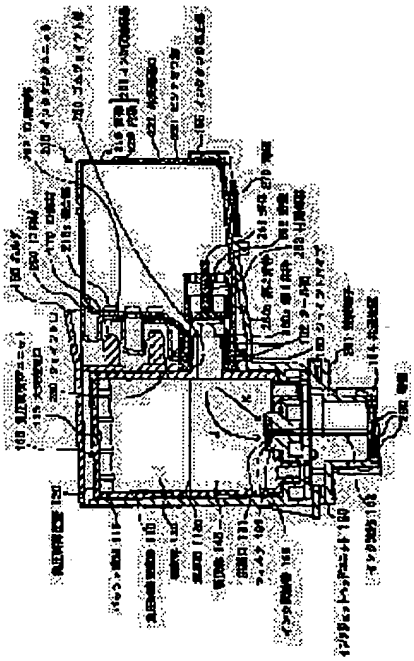
(54) LIQUID FEED SYSTEM AND LIQUID FEED CONTAINER USED IN THE SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To realize a stable liquid supply by detecting the presence/absence of a liquid in a liquid feed container by a simple and sure method.
SOLUTION: An ink storage container 201 for storing ink inside is connected via a joint opening 230 to a negative pressure control chamber container 110 in which absorbers 130 and 140 are stored, whereby ink is supplied to the negative pressure control chamber container 10. A bottom face of the ink storage container 201 is inclined to a horizontal face so that an end part at the side where the joint opening 230 is formed becomes low. An electrode 270 constituting a means for detecting the presence/absence of ink in the ink storage container 201 is arranged below a holder 150 holding the ink storage container 201 to conform to a shape of the bottom face of the ink storage container 201 in parallel to the bottom face of the ink storage container 201.



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CLAIMS

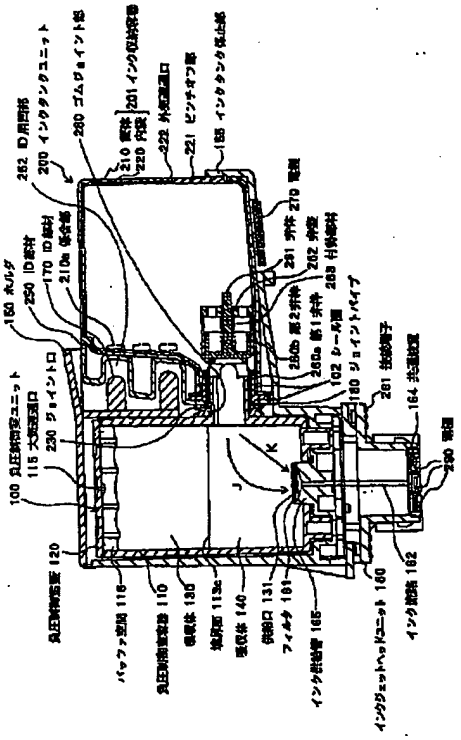
[Claim(s)]
[Claim 1] It has the electrode arranged under the liquid supply container equipped with liquid derivation **** for deriving a liquid outside. It is the liquid distribution system which has a detection means to detect the liquid existence in said liquid supply container with the electrostatic capacity corresponding to the opposed face product of the liquid in said liquid supply container, and said electrode. The base of said liquid supply container is a liquid distribution system characterized by inclining to a horizontal plane towards the end of said liquid supply container to the other end while said electrode is arranged the base of said liquid supply container, parallel, and non-contact, and having said liquid derivation section in the lower limit section of the lower one.
[Claim 2] The base of said liquid supply container is a liquid distribution system according to claim 1 with which it had the part parallel to a horizontal plane near said liquid derivation section, and said electrode is prolonged from said inclined part to the part parallel to said horizontal plane.
[Claim 3] While said liquid supply container is equipped with the liquid stowage which deforms with derivation of a case and the liquid contained inside while having the inside of this case, and the external surface of an abbreviation EQC and forming a substantial closed space except for said liquid derivation section Said detection means is a liquid distribution system according to claim 1 which detects change of the electrostatic capacity or the time constant based on change of the distance of the liquid in said liquid stowage by deformation of said liquid stowage, and said electrode.
[Claim 4] It is the liquid distribution system according to claim 1 characterized by each of this liquid supply container having the thickness of the side face which counters with an adjoining liquid supply container larger than the thickness of said electrode and the base which counters while adjoining mutually and having two or more said liquid supply containers so that the base may counter said electrode.
[Claim 5] The liquid distribution system according to claim 1 characterized by having the fragmentation structure of making said electrode and the liquid of the field which counters dividing said liquid feed zone side when it becomes said electrode of said liquid supply container, and the residue which the residue of the liquid in said liquid supply container should detect to the field by the side of said liquid feed zone rather than the part which counters.
[Claim 6] The liquid distribution system according to claim 1 characterized by having further the liquid derivation path of making each liquid derivation sections of the liquid supply container which holds the same liquid among these two or more liquid supply containers opening for free passage while adjoining mutually and having two or more said liquid supply containers so that the base may counter said electrode.
[Claim 7] The liquid distribution system according to claim 6 characterized by detecting the residue in the container of the predetermined number among said two or more liquid stowage containers by change of said electrostatic capacity.
[Claim 8] The liquid distribution system according to claim 6 characterized by preparing the opposed face product of said electrode and said two or more liquid stowage containers so that it

may differ, respectively.
[Claim 9] The liquid distribution system according to claim 1 characterized by detecting the liquid residue in said liquid supply container by detecting change of said electrostatic capacity or a time constant with said detection means.
[Claim 10] It is the liquid distribution system according to claim 1 which is equipped with the negative pressure generating member receipt room which contains a negative pressure generating member inside while connecting with said liquid supply container through said liquid derivation section, and is characterized by this negative pressure generating member receipt room having a liquid feed zone for deriving outside the liquid supplied through said liquid derivation section.
[Claim 11] Said liquid derivation section is a liquid distribution system according to claim 10 whose angle of the field in which it was prepared in the field inserted into the maximum area side of said liquid supply container, and said liquid derivation section of said liquid supply container was prepared, the field of the opposite side, and said base to make is an obtuse angle.
[Claim 12] Said negative pressure generating member receipt room and said liquid supply container are a liquid distribution system [disengageable in said liquid derivation section] according to claim 10.
[Claim 13] The negative pressure generating member receipt room which contains a negative pressure generating member inside while having a liquid feed zone for supplying a liquid outside, The liquid supply container which has the liquid stowage which is connected with said negative pressure generating member receipt room through a connection, and forms a substantial closed space except for said connection, It has at least the electrode arranged under said liquid supply container at the base of said liquid supply container, and parallel. It has a detection means to detect the liquid residue of said liquid stowage with the electrostatic capacity corresponding to the opposed face product of the liquid in said liquid stowage, and said electrode. Said liquid stowage The liquid distribution system which is an analog as substantially as the inside of said liquid supply container, and is characterized by consisting of members which can generate negative pressure because the field corresponding to the bottom surface part of said liquid supply container deforms.
[Claim 14] It has the electrode arranged under two or more liquid supply containers equipped with the liquid feed zone for supplying a liquid outside, respectively. In the liquid distribution system which has a detection means to detect the liquid residue in said liquid supply container with the impedance of the liquid in said liquid supply container, and said electrode Said liquid supply container is a liquid distribution system characterized by the thickness of the liquid supply container with which it adjoins mutually, and is arranged and said liquid supply container adjoins, and the side attachment wall which counters being larger than the thickness of said electrode and the bottom wall which counters.
[Claim 15] It has the electrode arranged under the liquid supply container equipped with the liquid feed zone for supplying a liquid outside. It is the liquid distribution system which has a detection means to detect the liquid residue in said liquid supply container with the impedance of the liquid in said liquid supply container, and said electrode. The liquid distribution system characterized by having the fragmentation structure of making said electrode and the liquid of the field which counters dividing said liquid feed zone side when it becomes said electrode of said liquid supply container, and the residue which the residue of the liquid in said liquid supply container should detect to the field by the side of said liquid feed zone rather than the part which counters.
[Claim 16] It is the liquid supply container characterized by to be a liquid supply container equipped with the liquid stowage which contains a liquid, and the liquid derivation section which derives this liquid outside, and to equip said liquid supply container with the base which counters the electrode arranged under said liquid supply container in order to detect the residue of the liquid in said liquid stowage with the electrostatic capacity corresponding to an opposed face product with said liquid.
[Claim 17] Said base is a liquid supply container according to claim 16 arranged by inclining to said electrode.

[Claim 18] Said liquid stowage is a liquid supply container [equipped with the case which is deformable and protects this liquid stowage outside] according to claim 16.
[Claim 19] It is the liquid supply container which have the liquid stowage which contains a liquid, and the liquid derivation section which derives this liquid outside, and said liquid stowage is made to adjoin, puts more than one in order, and is arranged. Said liquid stowage The liquid supply container characterized by the thickness of the liquid stowage where an electrode is equipped with the bottom wall by which opposite arrangement is carried out caudad in in order to detect the residue of the liquid in said liquid stowage with an impedance with said liquid, and said liquid stowage adjoins, and the side attachment wall which counters being larger than the thickness of said bottom wall.
[Claim 20] It is the liquid supply container equipped with the liquid stowage which contains a liquid, and the liquid derivation section which derives this liquid outside. Said liquid stowage An electrode is equipped with the bottom wall by which opposite arrangement is carried out caudad in order to detect the residue of the liquid in said liquid stowage with an impedance with said liquid. The liquid supply container characterized by having the fragmentation structure of making said electrode and the liquid of the field which counters dividing said liquid derivation section side when it becomes said electrode of said bottom wall, and the residue which the residue of the liquid in said liquid stowage should detect to the field by the side of said liquid derivation section rather than the part which counters.
[Claim 21] Said fragmentation structure is a liquid supply container according to claim 20 which is the projection prepared in the whole region at the inner bottom wall of said liquid stowage covering said electrode, the direction which goes to said liquid derivation section from the field which counters, and the crossing direction.
[Claim 22] Said projection is a liquid supply container according to claim 20 which is filling the relation of theta1>theta2 when it has the 1st field by the side of said liquid derivation section, and said electrode and the 2nd field of the side which counters and the include angle of theta 1 and said 2nd field is set to theta 2 for the include angle of said 1st field to the horizontal plane in a busy condition.

[Translation done.]

Drawing selection Representative drawing



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the liquid distribution system and liquid supply container of a liquid in a liquid stowage which can detect a residue especially about the liquid distribution system using negative pressure, in order to supply a liquid to the exterior.
[0002]
[Description of the Prior Art] As the liquid supply approach of using negative pressure in order to supply a liquid to the exterior conventionally, for example in the ink jet recording device field, the ink tank which gives negative pressure to an ink discharge head was proposed, and the configuration (head cartlidge) a recording head and whose unification were enabled has been carried out. If a head cartlidge is classified further, a recording head and an ink tank (ink hold section) can always divide it into the configuration of one, and the configuration which a record means and an ink stowage are another objects, and can separate both sides to a recording device, and uses, making into one at the time of use.
[0003] As one of the easiest approaches for generating negative pressure in such a liquid distribution system, the method of using the capillary force of a porous body is mentioned. The ink tank in this approach serves as a configuration which contains atmospheric-air free passage opening which can adopt air in an ink stowage in order to make smooth ink supply porous bodies, such as receipt and sponge by which compression receipt was carried out preferably, and under printing for the purpose of ink storage inside [whole] an ink tank.
[0004] However, it is mentioned as a technical problem in the case of using a porosity member as an ink attachment component that the ink receipt effectiveness per unit volume is low. In order to solve this technical problem, these people have proposed the ink tank used where the whole except the free passage section has the ink receipt room of real sealing to a negative pressure generating member receipt room and a negative pressure generating member receipt room is wide opened to atmospheric air in EP No. 0580433 official report. Moreover, in EP No. 0581531 official report, invention which made the ink receipt room exchangeable is proposed to the ink tank of above-mentioned structure. Since this invention should exchange only an ink receipt room when ink is lost, it can decrease trash and is based also on an environmental problem in recent years.
[0005] Since ink supply in a negative pressure generating member receipt room from an ink receipt room is performed by the vapor-liquid exchange actuation in which a gas is contained by the ink receipt interior of a room with derivation of the ink of the ink receipt interior of a room, an above-mentioned ink tank has the merit which can supply ink under almost certain negative pressure conditions during this vapor-liquid exchange actuation. [0006] Furthermore, these people have proposed equivalent to the case of an abbreviation multiple column configuration, and the inside of a case, or the liquid stowage container characterized by making thin the part which is equipped with a deformable stowage with derivation of the liquid which has the external surface of an analog and is contained inside, and constitutes a corner for the thickness of a stowage from a central region of each field of an abbreviation multiple column configuration in EP No. 0738605 official report. This liquid stowage container is what (vapor-liquid exchange has not

been carried out in phenomenon) a stowage contracts suitably with derivation of a liquid, and it can perform liquid supply, using negative pressure. Therefore, being restricted to the location to arrange compared with the conventional saccate ink stowage material is lost, and it can arrange on carriage. Moreover, it is invention which was excellent in holding direct ink to a stowage also from the point of improvement in ink receipt effectiveness.

[0007] As mentioned above, the liquid distribution system which has a negative pressure generating member receipt room and an ink receipt room is excellent in respect of stabilization of the improvement in ink receipt effectiveness, and ink supply characteristics, and what made the ink receipt room exchangeable also especially in it is excellent also from the point of an environmental problem.

[0008] The conventional vapor-liquid exchange actuation however, the ink derivation to a negative pressure generating member receipt room from an ink receipt room Since installation of the atmospheric air through the free passage section is being interlocked with, in supplying a lot of ink for a short time to the exteriors (liquid discharge head etc.) from a negative pressure generating member receipt room There was a possibility that the ink supply in a negative pressure generating member receipt room from the ink receipt room by vapor-liquid exchange actuation might run short to the rapid ink consumption in a negative pressure generating member receipt room. Therefore, also in order to cancel this ink short supply, it is necessary to get to know the condition of the ink in the ink receipt interior of a room.

[0009] By the way, as an approach of detecting the condition that the ink residue and the residue fell, in an ink jet recording device, two electrodes are prepared in an ink tank and the approach of detecting inter-electrode electric resistance and switch-on, the approach of allotting a photo sensor near the ink tank, while forming an ink tank by the member of translucency, and detecting the amount of transparency of the light which passes along an ink tank, and detecting the ink residue in an ink tank, etc. are learned.

[0010] However, in what prepares an electrode in an ink tank, when an ink tank is exchange system, with exchange of an ink tank, the part in connection with detection means, such as an electrode added to the ink tank, will also be exchanged for coincidence, and the rise of the manufacturing cost of an ink tank and the rise of a running cost will be caused. Moreover, by the approach of detecting the amount of transparency of the light which passes along an ink tank, it was easy to generate incorrect detection compared with the deep color in the ink of a light color like yellow.

[0011] Then, in order to cancel such fault, while preparing the 1st electrode in a recording head, the method of an ink tank being detecting the electrical potential difference which prepares the 2nd electrode in non-contact, and gives a pulse voltage to the 1st electrode, and this generates in the 2nd electrode, and detecting the residue of the ink in an ink tank near the ink tank, is indicated by JP,10-109430,A. As for this detection system, the input signal to the 1st electrode obtains a detecting signal from a recording head by the electrostatic coupling of propagation, an ink tank, and the 2nd electrode on an ink tank through ink.

[0012]

[Problem(s) to be Solved by the Invention] However, by the above-mentioned approach, when ink still remains in the ink of the magnitude of the electrostatic capacity by the electrostatic coupling mentioned above being lost in fact if ink remains in the electrode of an ink receipt room, and the wall surface which counters as a coat, since the existence of ink is detected based on the opposed face product of the 2nd electrode and ink, it may incorrect-detect.

[0013] Moreover, generally, since the magnitude of the electrostatic capacity by the electrostatic coupling mentioned above changes with the opposed face product of the 2nd electrode and ink, the opposite distance of the 2nd electrode and ink, etc., if these are specified, electrostatic capacity will be fundamentally stabilized by it and the time constant of an ink residue detection system will also be stabilized. However, when two or more ink receipt rooms, such as an ink jet recording device for color record, approach mutually and are put in order, electrostatic capacity will become the factor to which it changes also with the amounts of ink of an adjoining ink receipt room and which changes the time constant of an ink residue detection system. Change of a time constant causes [of the gain of a detecting signal] change, and a

possibility that the detection precision of an ink residue may fall has it.
[0014] The 1st purpose of this invention is offering the ink tank used for the liquid distribution system which realizes liquid supply especially stabilized in the available thing for which the existence of the ink in an ink tank is detected by the easy and positive approach suitable for EP No. 0738605 official report, EP No. 0581531 official report, etc., and this system.
[0015] the 2nd purpose of this invention — the 1st purpose of the above — in addition — or it is independent and two or more liquid receipt rooms are offering the liquid distribution system and liquid supply container which can supply the liquid stabilized by getting to know the liquid residue of the liquid receipt interior of a room with a sufficient precision in the configuration arranged at juxtaposition.
[0016] the 3rd purpose of this invention — the 1st and 2nd purpose of the above — in addition — or it is independent and is offering the liquid distribution system and liquid supply container which can supply the liquid stabilized by getting to know the liquid residue in a liquid stowage with a sufficient precision.
[0017]
[Means for Solving the Problem] The liquid distribution system of this invention for attaining the 1st above-mentioned purpose It has the electrode arranged under the liquid supply container equipped with the liquid derivation section for deriving a liquid outside. It is the liquid distribution system which has a detection means to detect the liquid existence in said liquid supply container with the electrostatic capacity corresponding to the opposed face product of the liquid in said liquid supply container, and said electrode. While said electrode is arranged the base of said liquid supply container, parallel, and non-contact, the base of said liquid supply container inclines from the end of said liquid supply container to a horizontal plane towards the other end, and is characterized by having said liquid derivation section in the lower limit section of the lower one.
[0018] Since according to the above-mentioned system the base of a liquid supply container inclines as mentioned above to a horizontal plane and it is prepared in the lower limit section of the one where the liquid derivation section is lower, if the liquid residue in a liquid stowage becomes lower than the above-mentioned inclined plane, an opposed face product with the electrode of ink will become small with reduction in a liquid. In connection with this, the electrostatic capacity detected with a detection means also becomes small, and is detected easily [that the liquid residue of a liquid stowage decreased by this], and certainly.
[0019] The liquid distribution system of the gestalt of further others of this invention The negative pressure generating member receipt room which contains a negative pressure generating member inside while having a liquid feed zone for supplying a liquid outside, The liquid supply container which has the liquid stowage which is connected with said negative pressure generating member receipt room through a connection, and forms a substantial closed space except for said connection, It has at least the electrode arranged under said liquid supply container at the base of said liquid supply container, and parallel. It has a detection means to detect the liquid residue of said liquid stowage with the electrostatic capacity corresponding to the opposed face product of the liquid in said liquid stowage, and said electrode. Said liquid stowage It is an analog as substantially as the inside of said liquid supply container, and is characterized by consisting of members which can generate negative pressure because the field corresponding to the bottom surface part of said liquid supply container deforms.
[0020] According to the above-mentioned system, the liquid stowage deformed inside during consumption of the liquid from a liquid feed zone, negative pressure with the supply negative pressure generating member receipt room of ink is balanced, but this deformation is generated also in the base of a liquid stowage. Therefore, if the ink in a liquid stowage becomes [a residue] close to the pars basilaris ossis occipitalis of a liquid stowage, an opposed face product with the electrode of a liquid will become small, and it will be detected easily [that the liquid residue decreased] and certainly by detecting the change.
[0021] Moreover, the liquid distribution system for attaining the 2nd above-mentioned purpose It has the electrode arranged under two or more liquid supply containers equipped with the liquid feed zone for supplying a liquid outside, respectively. In the liquid distribution system which has a detection means to detect the liquid residue in said liquid supply container with the impedance of

the liquid in said liquid supply container, and said electrode Said liquid supply container adjoins mutually, and is arranged, and thickness of the liquid supply container with which said liquid supply container adjoins, and the side attachment wall which counters is characterized by being larger than the thickness of said electrode and the bottom wall which counters.
[0022] Thus, as a liquid distribution system for attaining the 2nd above-mentioned purpose, wholeheartedly, this invention persons paid their attention to the electrostatic capacity between adjoining liquid stowage containers, when two or more liquid stowage containers adjoined and had been arranged in what detects the residue of the liquid in a liquid stowage container using electrostatic capacity as a result of examination.
[0023] The liquid residue in a liquid supply container is detected by this invention constituted as above-mentioned by detecting change of the impedance of the liquid in a liquid supply container (liquid stowage), and an electrode. Here the thickness of the wall surface of a liquid supply container (liquid stowage) Since the thickness of an adjoining liquid supply container and the side attachment wall which counters is larger than the thickness of an electrode and the bottom wall which counters The effect of the electrostatic capacity generated between adjoining liquid supply containers is suppressed. The liquid distribution system of this invention for attaining the 3rd above-mentioned purpose which becomes it can be more accurate and detectable about the residue of the liquid in the target liquid supply container again It has the electrode arranged under the liquid supply container equipped with the liquid feed zone for supplying a liquid outside. It is the liquid distribution system which has a detection means to detect the liquid residue in said liquid supply container with the impedance of the liquid in said liquid supply container, and said electrode. It is characterized by having the fragmentation structure of making said electrode and the liquid of the field which counters dividing said liquid feed zone side when it becomes said electrode of said liquid supply container, and the residue which the residue of the liquid in said liquid supply container should detect to the field by the side of said liquid feed zone rather than the part which counters.
[0024] The liquid residue in a liquid supply container is detected by this invention constituted as above-mentioned by detecting change of the impedance of the liquid in a liquid supply container (liquid stowage), and an electrode. Here, even if a liquid will remain in the bottom wall of a liquid supply container in the shape of film if the residue of the liquid in a liquid supply container decreases since it has fragmentation structure in the bottom wall of a liquid supply container (liquid stowage), an electrode and the liquid of the field which counters are divided certainly a connection (liquid derivation section) side. The electric circuit between the electrode through the bottom wall of a liquid supply container and a liquid is divided by this, an impedance becomes high, and it is detected that the liquid residue in a liquid supply container decreased by detecting this.
[0025] Fragmentation structure can be made into the projection and level difference which were prepared in the whole region covering the electrode, the direction which goes to the liquid derivation section from the field which counters, and the crossing direction. When fragmentation structure is especially considered as a projection and the include angle of the field by the side of the field which counters the include angle of the field by the side of the liquid derivation section of a projection with the electrode of theta 1 and a projection to the horizontal plane in a busy condition is set to theta 2, theta1> By preparing a projection so that the relation of theta 2 may be filled, the liquid divided by the projection becomes easy to go to a liquid derivation section side, and stops being able to go to an electrode and the side to counter easily.
[0026] Moreover, the liquid supply container may have the crevice accompanying the above-mentioned projection in the skin, in the liquid distribution system which has the holder which holds this liquid supply container removable in this case, it is preparing the projection which fits into the crevice of a liquid supply container in a holder, and positioning of a liquid supply container is made.
[0027] Moreover, this invention also offers the liquid supply container used for each above-mentioned liquid distribution system.
[0028] The liquid supply container of this invention is a liquid supply container equipped with the liquid stowage which contains a liquid, and the liquid derivation section which derives this liquid

outside, and is characterized by to equip said liquid supply container with the base which counters the electrode arranged under said liquid supply container in order to detect the residue of the liquid in said liquid stowage with the electrostatic capacity corresponding to an opposed face product with said liquid.

[0029] The liquid stowage container of other gestalten of this invention is equipped with the liquid stowage which contains a liquid, and the liquid derivation section which derives this liquid outside. It is the liquid supply container which said liquid stowage is made to adjoin, puts more than one in order, and is arranged. Said liquid stowage In order to detect the residue of the liquid in said liquid stowage with an impedance with said liquid, an electrode is equipped with the bottom wall by which opposite arrangement is carried out caudad, and it is characterized by the thickness of the liquid stowage where said liquid stowage adjoins, and the side attachment wall which counters being larger than the thickness of said bottom wall.

[0030] Liquid stowage container of the gestalt of further others of this invention, it is the liquid supply container equipped with the liquid stowage which contains a liquid, and the liquid derivation section which derives this liquid outside. Said liquid stowage An electrode is equipped with the bottom wall by which opposite arrangement is carried out caudad in order to detect the residue of the liquid in said liquid stowage with an impedance with said liquid. It is characterized by having the fragmentation structure of making said electrode and the liquid of the field which counters dividing said liquid derivation section side when it becomes said electrode of said bottom wall, and the residue which the residue of the liquid in said liquid stowage should detect to the field by the side of said liquid derivation section rather than the part which counters..

[0031]

[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained with reference to a drawing.

[0032] In addition, the "hardness" of the capillary force generating member in this invention is "hardness" at the time in the condition that the capillary force generating member is held in the liquid stowage container, and it is prescribed by the inclination (unit: N/mm) of the repulsive force over the deformation of a capillary force generating member. The size of the "hardness" of two capillary force generating members uses the capillary force generating member with the larger inclination of the repulsive force over deformation as "a hard capillary force generating member."

[0033] <Whole configuration> The sectional view is shown for the perspective view of the ink jet head cartlidge which is one operation gestalt of this invention in drawing 1 at drawing 2 .

[0034] This operation gestalt explains each of each element which constitutes the ink jet head cartlidge to which this invention is applied, and those relation. This operation gestalt is made to explain the whole, explaining these configurations, since it has the composition that many new techniques made in the formation phase of this invention were applied.

[0035] The ink jet head cartlidge of this operation gestalt consists of the ink jet head unit 160, an electrode holder 150, a negative pressure control room unit 100, an ink tank unit 200, etc., as shown in drawing 1 and drawing 2 . The negative pressure control room unit 100 is fixed in an electrode holder 150, and the ink jet head unit 160 is being fixed to the lower part of the negative pressure control room unit 100 through the electrode holder. In addition, immobilization with the electrode holder 150, the negative pressure control room unit 100 and the electrode holder 150, and the ink jet head unit 160 which were explained here is making each other into easily decomposability by the screw stop, engagement, etc., and is effective to the cost cut to change of configurations, such as a field of recycle, and modification of a version, etc. Moreover, since the lives of the components of each part differ, it is desirable to make it easily decomposability also in respect of saying that only the components which require exchange are simply exchangeable. However, of course depending on conditions, you may fix completely with joining, heat caulking, etc. The negative pressure control room unit 100 consists of a negative pressure control room container 110 with which opening was formed in the top face, a negative pressure control room lid 120 attached in the top face of the negative pressure control room container 110, and two absorbers 130 and 140 for carrying out sinking-in maintenance of the ink with which it was loaded into the negative pressure control room container 110. Absorbers 130

and 140 are accumulated on two steps of upper and lower sides in the busy condition of this ink jet head cartlidge, each other are stuck, and it fills up in the negative pressure control room container 110, and since the capillary force which the absorber 140 of the lower berth generates is higher than the capillary force which the absorber 130 of an upper case generates, the absorber 140 of the lower berth of ink holding power is more expensive. The ink in the negative pressure control room unit 100 is supplied to the ink jet head unit 160 through the ink supply pipe 165.

[0036] The filter 161 is formed in the feed hopper 131 at the tip by the side of the absorber 140 of the ink supply pipe 165, and the filter 161 is pressing the absorber 140. The ink tank unit 200 has composition which can be detached and attached freely to the electrode holder 150. The joint pipe 180 which is the joint-ed prepared in the field by the side of the ink tank unit 200 of the negative pressure control room container 110 is inserted in the interior of the joint opening 230 of the ink tank unit 200, and is connected. Through the connection of the joint pipe 180 and joint opening 230, the negative pressure control room unit 100 and the ink tank unit 200 are constituted so that the ink in the ink tank unit 200 may be supplied into the negative pressure control room unit 100. The ID member 170 for incorrect wearing prevention of the ink tank unit 200 projected from the field is formed in the upper part rather than the joint pipe 180 in the field by the side of the ink tank unit 200 of the negative pressure control room container 110.

[0037] The atmospheric-air free passage opening 115 for making the negative pressure control room lid 120 open for free passage the interior of the negative pressure control room container 110, the open air, and the absorber 130 and the open air that were contained in the negative pressure control room container 110 here is formed. Near the atmospheric-air free passage opening 115 in the negative pressure control room container 110, the buffer space 116 which consists of space formed with the rib projected from the field by the side of the absorber 130 of the negative pressure control room lid 120 and a field where the ink in an absorber (liquid) does not exist is formed.

[0038] The valve system is prepared in the joint opening 230, and the valve system consists of 1st valve-yoke 260a, 2nd valve-yoke 260b, a valve element 261, an operculum 262, and an energization member 263. A valve element 261 is energized by the energization member 263 at the 1st valve-yoke 260a side while it is supported possible [sliding] within 2nd valve element 260b. In the condition that the joint pipe 180 is not inserted into the joint opening 230, the airtightness in the ink tank unit 200 is maintained from the edge of the part by the side of 1st valve-yoke 260a of a valve element 261 being pressed by 1st valve-yoke 260a according to the energization force of the energization member 263.

[0039] The joint pipe 180 is inserted in the interior of the joint opening 230, and the inside of the joint pipe 180 is open for free passage with the interior of the ink tank unit 200 through opening formed in the side face of 2nd valve-yoke 260b by moving in the direction which a valve element 261 is pressed and separates from 1st valve-yoke 260a with the joint pipe 180. The airtight in the ink tank unit 200 is opened wide by this, and the ink in the ink tank unit 200 is supplied into the negative pressure control room unit 100 through the joint opening 230 and the joint pipe 180. That is, when the valve in the joint opening 230 opens, the ink hold circles of the ink tank unit 200 which was in the sealing condition will be in a free passage condition to the negative pressure control room unit 100 through said opening.

[0040] Since each unit can be removed and exchanged according to the service life, it is desirable to fix the ink jet head unit 160 and the negative pressure control room unit 100 by the approach of having easily decomposability, such as ****, to an electrode holder 150, like this operation gestalt here in the condition that the ink jet head unit 160 and the negative pressure control room unit 100 are fixed to an electrode holder 150, respectively.

[0041] namely, in the ink jet head cartlidge of this operation gestalt Usually, although negative pressure control room is not equipped with the ink tank which holds the ink of the class which changes accidentally with ID members prepared in the ink tank What is necessary is to exchange only the negative pressure control room unit 100, if it is immediately after wearing when a user equips the negative pressure control room unit 100 with the ink tank of an intentionally different class, damage on ID member prepared in the negative pressure control room unit 100, and.

Moreover, when an electrode holder 150 is damaged by fall etc., it is also possible to exchange only an electrode holder 150.
[0042] In addition, when separating the negative pressure control room unit 100, an electrode holder 150, and the ink jet head units 160 including the ink tank unit 200, respectively, it is desirable to determine that the location of a fixed part can prevent the ink leakage from each unit.
[0043] In the case of this operation gestalt, since the ink tank unit 200 has combined with the negative pressure control room unit 100 using the ink tank stop section 155 of an electrode holder 150, only the negative pressure control room unit 100 does not separate from it to other units in the condition of having been fixed. That is, if the ink tank unit 200 is not removed from an electrode holder 150 at least, it will come to be hard to separate the negative pressure control room unit 100 from the electrode holder 150. Thus, since the negative pressure control room unit 100 has structure which is easy to remove from an electrode holder 150 only after removes the ink tank unit 200, it does not have occurring [the ink leakage from the bond part by the ink tank unit 200 dissociating from the negative pressure control room unit 100 carelessly] fear.
[0044] Moreover, the filter 161 is formed in the edge of the ink supply pipe 165 of the ink jet head unit 160, and even if it is in the condition which separated the negative pressure control room unit 100, there is no possibility that the ink in the ink jet head unit 160 may begin to leak. In addition, the thing for which the negative pressure control room unit 100 is equipped with the buffer space 116 (the field which does not hold an absorber 130 and the ink in 140 is also included) which prevents leakage **** of the ink in an ink tank, Moreover, the thing established for interface 113c of two absorbers 130 and 140 with which capillary force differs up with the posture at the time of use from the joint pipe 180 (desirably) By what the capillary force of the layer of the near which contains interface 113c like this operation gestalt is higher than the field of absorbers 130 and 140 There are few possibilities that, as for the structure which the electrode holder 150, the negative pressure control room unit 100, and the ink tank unit 200 unified, ink may begin to leak even if the posture changes. Therefore, it is easily disengageable also in the condition that equip with a fixed part the base which is the field side where the ink jet head unit 160 has the connection terminal of an electrode holder 150 with this operation gestalt, and the electrode holder 150 is equipped with the ink tank unit 200.
[0045] In addition, depending on the configuration of an electrode holder 150, the negative pressure control room unit 100 or the ink jet head unit 160, and an electrode holder 150 may unite with separation impossible. You may make it separation impossible with an approach, heat caulking, etc. which are fabricated beforehand in one as the approach of unification.
[0046] As shown in drawing 2 , drawing 3 (a), and drawing 3 (b), the ink tank unit 200 consists of an ink stowage container 201, a valve system containing 1st valve-yoke 260a and 2nd valve-yoke 260b, and an ID member 250. The ID member 250 is a thing for [of the ink tank unit 200 and the negative pressure control room unit 100] preventing incorrect wearing in the case of wearing.
[0047] A valve system controls the flow of ink within the joint opening 230, and performs a switching action by engaging with the joint pipe 180 of the negative pressure control room unit 100. the valve-opening close at the time of attachment and detachment — becoming complicated — it has prevented according to the structure which regulates a tank operating range by the valve configuration and the ID member 170 which are mentioned later, and the crevice 252 for ID.
[0048] <Ink tank unit> Drawing 3 is a perspective view for explaining the ink tank unit 200 shown in drawing 2 . Drawing 3 (a) is the perspective view showing the ink tank unit 200, and drawing 3 (b) is the perspective view showing the condition that the ink tank unit 200 was decomposed.
[0049] Moreover, in the front face which becomes the negative pressure control room unit 100 side of the ID member 250, the part above the feed hopper hole 253 serves as an inclined plane 251. The inclined plane 251 inclines toward the ink stowage container 201 side, i.e., back, from the front end side by the side of the feed hopper hole 253 of the ID member 250. In this inclined plane 251, two or more (drawing 3 three) formation of the crevice 252 for ID for incorrect

insertion prevention of the ink tank unit 200 is carried out. With this operation gestalt, the ID member 250 is arranged in the front face (field which has a feed hopper) which becomes the negative pressure control room unit 100 side of the ink stowage container 201.
[0050] the ink stowage container 201 has a negative pressure generating function — it is the hollow container of a multiple column configuration mostly. The ink stowage container 201 consists of a case 210 and PE liner 220 (refer to drawing 2), and exfoliation of a case 210 and PE liner 220 is attained respectively. PE liner 220 has flexibility and this PE liner 220 is deformable in connection with derivation of the ink contained inside. Moreover, PE liner 220 has the pinch-off section (welding) 221, and is supported in the form where PE liner 220 engages with a case 210 in this pinch-off section 221. Moreover, the open air free passage opening 222 is formed in the part near the pinch-off section 221 of a case 210, and atmospheric air can be introduced between PE liner 220 and a case 210 through the open air free passage opening 222.
[0051] As shown in drawing 19 , PE liner 220 consists of three layers to which the laminating of ******220c which has ink-proof nature, modulus-of-elasticity rule layer 220b, and the gas barrier layer 220a excellent in gas barrier nature was carried out sequentially from the inside, and functional separation of each layer is carried out in the state of junction. Elastic-modulus rule layer 220b is kept almost constant [the elastic modulus of elastic-modulus rule layer 220b] by service temperature within the limits of the ink stowage container 201, and the elastic modulus of PE liner 220 is kept almost constant by the elastic-modulus rule layer 220b by service temperature within the limits of the ink stowage container 201. A middle layer and an outside layer may interchange in PE liner 220, and modulus-of-elasticity rule layer 220b may be [gas barrier layer 220a] a middle layer in the outermost layer.
[0052] Thus, by constituting PE liner 220, PE liner 220 becomes possible [fully demonstrating the function of each layer] in few layers ink-proof layer and modulus-of-elasticity rule layer 220b and gas barrier layer 220a, and the effect to temperature changes, such as a modulus of elasticity of PE liner 220, decreases. Moreover, in PE liner 220, since the elastic modulus for which it was suitable in order to control the negative pressure in the ink stowage container 201 by service temperature within the limits is secured, it will have the function of the buffer which PE liner 220 mentions later to the ink in the ink stowage container 201 and the negative pressure control room unit 110 (it mentions later in detail.). Therefore, since the field where the buffer room established in the upper part in the negative pressure control room container 110, i.e., the part with which the ink absorber is not filled up, an absorber 130, and the ink in 140 do not exist can be decreased, the negative pressure control room unit 100 can be miniaturized, and the ink jet head cartlidge 70 with a high utilization ratio is realized.
[0053] In this operation gestalt, EVOH (ghost which is not removed EVA (ethylene-vinyl acetate copolymer resin)) is used [as the quality of the material of ****** 220c of the innermost part which constitutes PE liner 220] as the quality of the material of gas barrier layer 220a of an annular olefin copolymer and the outermost part as the quality of the material of polypropylene and middle modulus-of-elasticity rule layer 220b. Here, since it is not necessary to have a glue line specially between mutual layers by including a functional adhesion resin ingredient in elastic-modulus rule layer 220b, thickness of PE liner 220 can be made thin and it is desirable.
[0054] As the quality of the material of a case 210, the same polypropylene as the innermost layer of PE liner 220 is used. Moreover, polypropylene is used also as the quality of the material of 1st valve-yoke 260a.
[0055] The ID member 250 has two or more crevices 252 for ID established in each right and left corresponding to two or more ID members 170 for incorrect wearing prevention of the ink tank unit 200, and is being fixed to the ink stowage container 201.
[0056] Since an incorrect wearing prevention device consists of that the crevice 252 for ID is formed in the ID member 250 corresponding to two or more ID members 170 prepared in the negative pressure control room unit 100 side, the incorrect wearing prevention function obtained by the ID member 170 and the crevice 252 for ID turns into that it is possible to achieve ID function of varieties by changing the configuration and location of the ID member 170 and the crevice 252 for ID.
[0057] The crevice 252 for ID of the ID member 250 and the joint opening 230 of 1st valve-yoke

260a are located in the front face used as the front of the path of insertion of the ink tank unit 200, and are formed by two members of the ID member 250 and 1st valve-yoke 260a.
[0058] Moreover, the ink hold container 201 is formed by blow molding, the ID member 250 and 1st valve-yoke 260a are formed with injection (injection) shaping, and it becomes possible by considering the ink tank unit 200 as the configuration of three members to fabricate valve portion material and the crevice 252 for ID with a sufficient precision.
[0059] Since it is uninfluential to it being complicated to exfoliation of PE liner 220 of ink stowage container 201 inner layer when such a crevice 252 for ID is directly formed in the ink stowage container 201 which is the blowtank produced by blow molding, i.e., the configuration in an ink tank, it may be affected to the negative pressure generated in the ink tank unit 200. However, it becomes generating of the stable negative pressure in the ink stowage container 201, and controllable by using as the ink stowage container 201 and another member the ID member 250 which is the ID section like the configuration of the ink tank unit 200 which can set this operation gestalt, since there are no above effects on the ink stowage container 201 by attaching the ID member 250 in the ink stowage container 201.
[0060] 1st valve-yoke 260a is joined to PE liner 220 of the ink stowage container 201 at least. 1st valve-yoke 260a is joined by joining of PE liner outcrop 221a of PE liner 220 which hits the ink derivation section of the ink stowage container 201 to PE liner 220, and the field where the part of the joint opening 230 corresponds. Here, since a case 210 is also the same polypropylene as the innermost layer of PE liner 220, it is also possible to perform joining of 1st valve-yoke 260a and a case 210 also around the joint opening 230.
[0061] While the location precision by joining becomes high by this, the seal of the feed hopper section of the ink stowage container 201 is carried out completely, and the ink leakage from the seal part of the 1st valve-yoke 260a and the ink stowage container 201 in the time of attachment and detachment of the ink tank unit 200 etc. is prevented. Like the ink tank unit 200 in this operation gestalt, in case junction by joining is carried out, it is desirable that the quality of the material of a layer and the quality of the material of 1st valve-yoke 260a which serve as an adhesion side of PE liner 220 when raising seal nature are the same.
[0062] Moreover, in junction to a case 210 and the ID member 250, when click section 250a formed in the field which counters the sealing surface 102 joined to the ink stowage container 201 of 1st valve-yoke 260a, and the lower part of the ID member 250 and engagement section 210a of the lateral portion of a case 210, and click section 250a by the side of the ID member 250 corresponding to it are engaged, engagement immobilization of the ID member is carried out at the ink stowage container 201.
[0063] As for engagement immobilization here, it is desirable to make it the structure which was engaged, inserted in and gave the easily decomposability by doubling etc. by irregularity. Thus, by making the ID member 250 into an engagement fixed condition to the ink stowage container 201, since it is in the minute movable possible condition mutually, the force by contact to the ID member 170 and the crevice 252 for ID at the time of attachment and detachment can be absorbed, and breakage of the ink tank unit 200 and the negative pressure control room unit 100 can be prevented.
[0064] Moreover, it becomes easy to decompose the ink tank unit 200 by making the ID member 250 engage with an engagement fixed condition partially to the ink stowage container 201 in this way, and is effective in the viewpoint of recycle. Moreover, in this way, by establishing the crevice for engagement in the side face of a case 210 as engagement section 210a, in case the ink stowage container 201 is produced by blow molding, a configuration becomes simple, the mold member at the time of shaping also becomes simple, and management of thickness also becomes easy.
[0065] Furthermore, in junction to a case 210 and the ID member 250, since click section 250a is made to engage with engagement section 210a where it carried out where 1st valve-yoke 260a is joined to a case 210, and 1st valve-yoke 260a is put around joint opening 230, it becomes possible the ink tank unit 200 at the time of attachment and detachment, and to aim at improvement in the reinforcement of the joint section especially.
[0066] Moreover, since the part covered with the ID member 250 became a crevice configuration

and the part of a feed hopper has projected the ink stowage container 201, by fixing the ID member 250 to the ink stowage container 201, it can project in the front face of the ink tank unit 200, and can abolish a configuration. Furthermore, since the welding of 1st valve-yoke 260a and the ink stowage container 201 is covered with the ID member 250, the welding can be protected. In addition, the relation of the irregularity of engagement section 210a of a case 210 and click section 250a of the ID member 250 corresponding to it may be reverse.

[0067] Moreover, as mentioned above, at the time of wearing of the ink tank unit 200, positive wearing which does not have ink leakage by the joint pipe 180 and valve portion material is performed. In this operation gestalt, it is forming the rubber joint section 280 which is an elastic member in the perimeter of the joint pipe 180 of the negative pressure control room unit 100, and sudden ink leakage is supported. This rubber joint section 280 seals the ID member 250 by being equipped with the ink tank unit 200. By this sealing, the mutual adhesion of the negative pressure control room unit 100 and the ink tank unit 200 improves.

[0068] In case the ink tank unit 200 is removed, this adhesion force can turn into drag force. However, since the ID member 250 and the ink stowage container 201 are combined with the engagement condition in the configuration of this invention, the clearance is formed between the ID member 250 and the ink stowage container 201 and air is introduced between the rubber joint section 280 and the ID member 250 from this clearance, the force at the time of ink tank 200 balking is mitigated. Therefore, ink leakage etc. does not take place.

[0069] Moreover, location regulation of the direction of the ink stowage container 201 and the ID member 250 in every direction can be performed. The junction approach of the ink stowage container 201 and the ID member 250 is not restricted to a gestalt which was mentioned above, and the engagement location and the fixed approach are possible for it also with another means.

[0070] As shown in drawing 2 and drawing 22 , the pars basilaris ossis occipitalis of the ink stowage container 201 inclines in the direction which occurs to the upper part, and the lower part of the part of the joint opening 230 side and the opposite side of the ink stowage container 201 is engaging with the ink tank stop section 155 of an electrode holder 150. In case the ink tank unit 200 is removed from an electrode holder 150, it has the composition that the engagement section with the ink tank stop section 155 of the ink stowage container 201 is raised up, and the ink tank unit 200 rotates mostly at the time of attachment-and-detachment actuation of the ink tank unit 200. In this operation gestalt, this rotation core becomes a feed hopper (joint opening 230) mostly. However, a rotation core changes so that it may mention later strictly. In such attachment-and-detachment actuation of the ink tank unit 200 by rotation, mostly The distance from the rotational supporting point to the corner for ink tank stop section 155 flank of the ink tank unit 200, In relation with the distance from the supporting point to the ink tank stop section 155 ****** of the ink tank unit 200 and the ink tank stop section 155 may occur, and faults, such as deformation in the unnecessary force in wearing actuation, the ink tank unit 200, and each press section of an electrode holder 150, may happen, so that the former becomes longer than the latter.

[0071] Since ****** beyond the need in rotation of the ink tank unit 200 can be prevented in the ink tank unit 200 and each engagement section of an electrode holder 150 by making a bottom surface part incline like the ink stowage container 201 of this operation gestalt, and raising the lower limit of the part which becomes the ink tank stop section 155 side of the ink stowage container 201, it becomes possible to perform attachment-and-detachment actuation of the ink tank unit 200 good.

[0072] In the ink jet head cartlidge of this operation gestalt, the joint opening 230 is formed in the lower part of one side face used as the field by the side of the negative pressure control room unit 100 of the ink stowage container 201, it is the field of the joint opening 230 side and the opposite side of the ink stowage container 201, and also the part of the lower part [of a side face], i.e., the back end section, bottom is engaging with the ink tank stop section 155. Moreover, the upper part of the ink tank stop section 155 has extended from the pars basilaris ossis occipitalis of an electrode holder 150 in the upper part to the almost same height as the main quantity 603 of the joint opening 230. Thereby, horizontal migration of the joint opening 230 is certainly regulated by the ink tank stop section 155, and the connection condition of the joint

opening 230 and the joint pipe 180 can be held good. Here, in order to hold certainly connection with the joint opening 230 and the joint pipe 180 at the time of wearing of the ink tank unit 200, the upper limit of the ink tank stop section 155 is arranged at the almost same height as the upper part of the joint opening 230. And the electrode holder 150 is equipped removable by rotation actuation centering on a part of front face of the joint opening 230 side of the ink tank unit 200. In attachment-and-detachment actuation of the ink tank unit 200, the part which ran against the negative pressure control room unit 100 of the ink tank unit 200 serves as the center of rotation of the ink tank unit 200. Thus, as mentioned above, when the pars basilaris ossis occipitalis of the back end section of the ink stowage container 201 inclines by the ink jet head cartlidge Since the difference of the distance from the center of rotation 600 to the ink tank stop section upper limit 601 and the distance from the center of rotation 600 to the ink tank stop section lower limit 602 can be made small, In the ink tank unit 200 and each engagement section of an electrode holder 150, ****** beyond the need in rotation of the ink tank unit 200 can be prevented, and it becomes possible to perform attachment-and-detachment actuation of the ink tank unit 200 good.

[0073] By forming the ink stowage container 201 and the electrode holder 150 in the above configurations, when magnitude of the joint opening 230 is enlarged for high-speed supply of ink, at the time of attachment-and-detachment actuation of the ink tank unit 200, it can become complicated as the lower limit section of the ink stowage container 201 back end, and the ink tank stop section 155, and a field can be decreased. Although this secures the stability at the time of equipping an electrode holder 150 with the ink tank unit 200, useless ****** with the ink tank stop section 155 at the time of wearing of the ink tank unit 200 is avoidable.

[0074] Here, it explains to a detail using drawing 22 . When the distance from the center of rotation 600 in attachment-and-detachment actuation of the ink tank unit 200 to the ink tank stop section lower limit 602 of the ink tank unit 200 becomes larger beyond the need than the distance from the center of rotation 600 to the ink tank stop section upper limit 601, the force needed for attachment-and-detachment actuation becomes very strong, the ink tank stop section upper limit 601 may be able to be deleted, or the ink stowage container 201 may deform. Therefore, the difference of the distance from the center of rotation 600 of the ink tank unit 200 to the ink tank stop section lower limit 602 of the ink tank unit 200 and the distance from the center of rotation 600 to the ink tank stop section upper limit 601 demonstrating the moderate fixed force, it is the range excellent in attachment-and-detachment nature, and is desirable. [of a thing small as much as possible]

[0075] Moreover, since the distance from the center of rotation 600 of the ink tank unit 200 to the ink tank stop section upper limit 601 becomes longer than the distance from the center of rotation 600 to the ink tank stop section lower limit 602 when the center of rotation 600 of the ink tank unit 200 is located in a location lower than the core of the joint opening 230, it will be hard coming to stop the ink stowage container 201 in the height of the core of the joint opening 230 correctly. Therefore, since the core of the height direction of the joint opening 230 is fixed correctly, as for the center of rotation 600 of the ink tank unit 200, it is more desirable than the core of the height direction of the joint opening 230 that it is up.

[0076] Moreover, when the center of rotation 600 of the ink tank unit 200 is raised more nearly up than the main height 603 of the joint opening 230, the thickness of the part which hits the ink tank stop section 155 of the ink tank unit 200 becomes large, the part which hits the ink tank stop section 155 will increase, and possibility that the ink tank unit 200 and an electrode holder 150 will be damaged will become high. Therefore, the center of rotation 600 of the ink tank unit 200 has a desirable direction near the core of the height direction of the joint opening 230 from a viewpoint of the attachment-and-detachment nature of the ink tank unit 200. Moreover, although what is necessary is just to decide suitably the height of the ink tank stop section 155 of the ink tank unit 200 based on the attachment-and-detachment nature of the ink tank unit 200, if it is made higher than the center of rotation 600, since the part worn by attachment-and-detachment actuation by the contact distance of the stop section of the ink tank unit 200 and an electrode holder 150 becoming long will increase, when degradation of the ink tank units 200 and 150 is taken into consideration, it is desirable [the height] that it is lower than the center

of rotation 600 of the ink tank unit 200.
[0077] Moreover, although the energization force for fixing the horizontal location of the ink stowage container 201 is based on what is depended on the energization member 263 which energizes a valve element 261, and the repulsive force of the rubber joint section 280 (refer to drawing 4) in the ink jet head cartlidge of this operation gestalt It may not be restricted only to such a gestalt but the energization means for fixing the horizontal location of the ink stowage container 201 to the ink stowage container 201 back end at a field or the negative pressure control room unit 100 by the side of the ink stowage container 201 of the stop section and the ink tank stop section 155 etc. may be established. In addition, in the condition that the ink stowage container be connect, the rubber joint section 280 will be in the condition of having been pressed fit on the wall surface of negative pressure control room and an ink tank, and can play the auxiliary role of the seal by the projection for seals mention later besides make the airtightness of a bond part (joint pipe periphery) secure (the field where ** be also expose to atmospheric air without perfect airtightness just be make few.).
[0078] Next, the configuration inside the negative pressure control room unit 100 is explained.
[0079] Inside the negative pressure control room unit 100, the member which generates the negative pressure of the two-step configuration on which the absorber 140 was accumulated for the absorber 130 as the lower berth on the upper case is contained. Therefore, the absorber 130 was open for free passage with the atmospheric-air free passage opening 115, and it has stuck an absorber 140 with the filter 161 on the inferior surface of tongue while sticking it with an absorber 130 on the top face. Interface 113c with absorbers 130 and 140 is the upper part from the upper limit of the joint pipe 180 as the free passage section in the posture at the time of use.
[0080] It consists of a fiber object with which the grain direction was arranged mostly, that main grain direction inclines to the direction of a vertical, where this ink jet head cartlidge 70 is carried in a printer, and absorbers 130 and 140 are contained in the negative pressure (it becomes abbreviation horizontal direction like this operation gestalt desirably like) control room container 110.
[0081] Such absorbers 130 and 140 with which the grain direction was arranged For example, the staple fiber which consists of thermoplastics by which crimp was carried out as fiber (die length of about 60mm) for example, mixed fiber, such as polypropylene and polyethylene, constitutes — having — after arranging a grain direction for the fiber lump which uses and consists of this staple fiber with a carding machine — heating (the temperature in the case of heating) It is relatively higher than the melting point of polyethylene with the low melting point, and is manufactured by cutting relatively to the die length of the request with desirable temperature lower than the melting point of polypropylene with the high melting point. Here, although the capillary force which the grain direction of the surface is more ready relatively compared with the center section, and generates the fiber member of this operation gestalt is also large compared with the center section, the front face is equipped with some irregularity generated the shape not of a mirror plane but when mainly bundling a sliver, and has the intersection by which welding was carried out also in the surface section in three dimension. For this reason, interface 113c of the absorbers 130 and 140 with which the grain direction was arranged is that the front faces which have irregularity contact, and ink will be in the condition of receiving horizontally and having a moderate fluidity, as a whole in accordance with the surface field of each absorbers 130 and 140 of that near. namely, compared with a surrounding field, an ink fluidity is markedly alike, only interface 113c is excellent, and it is not said as the result that it makes ink pass between the clearance between the negative pressure control room container 110 and absorbers 130 and 140, and interface 113c therefore, the upper part of the joint pipe [in / the time of use / for interface 113c of absorbers 130 and 140 / a posture] 180 — desirably By preparing near the upper part of the joint pipe 180 like this operation gestalt In the vapor-liquid exchange actuation mentioned later, the interface of the absorber 130 under vapor-liquid exchange actuation, and the ink in the inside of 140 and a gas can be set to interface 113c, and ****** in the head section under ink supply actuation can be stabilized as a result.
[0082] Moreover, if its attention is paid to the directivity as a fiber member, as shown in drawing

20 , each fiber has the structure of having relation because a part of intersection between fiber welds by thermoforming, about it and the direction F2 which goes direct while being continuously arranged by the longitudinal direction F1 prepared mainly with the carding machine. For this reason, if absorbers 130 and 140 are pulled to F 2-way in drawing which cannot break easily even if it adds hauling in the F1 in drawing direction, compared with the case of F1 direction, it is easily separable by the bond part between fiber being destroyed.

[0083] Since the grain direction F1 which are the absorbers 130 and 140 which consist of fiber, and becomes main in this way exists, the fluidity of ink differs from the method of maintenance by the quiescent state by the grain direction F2 which intersects perpendicularly with the grain direction F1 which becomes main, and it.

[0084] If it sees in a detail further about the internal structure of absorbers 130 and 140, the staple fiber by which crimp was carried out as shown in drawing 21 (a) will be in the condition that it is shown in drawing 21 (b) by being heated after the grain direction has gathered to some extent. Here, the field alpha where two or more staple fibers had lapped with the grain direction in drawing 21 (a) has the high probability for welding of the intersection to be carried out, as shown in drawing 21 (b), and the continuous fiber which cannot go out easily to F1 direction shown in drawing 20 is formed in a grain direction as a result. Moreover, by using the staple fiber by which crimp was carried out, the edge field (beta, gamma which are shown in drawing 21 (a)) of a staple fiber has been welded to other staple fibers enough (beta) in three dimension, as shown in drawing 21 (b), and it remains as an edge as it is (gamma), or it is carried out. In addition, since all fiber has not gathered in the same direction, welding of after heating is carried out for the staple fiber (epsilon shown in drawing 21 (a)) which inclines and touches so that it may cross from the start to other staple fibers as it is (epsilon shown in drawing 21 (b)). Thus, compared with the conventional one direction fiber bundle, fiber with high reinforcement is formed also to F 2-way.

[0085] Moreover, with this operation gestalt, such absorbers 130 and 140 are arranged so that the grain direction F1 which becomes main may become abbreviation parallel from an abbreviation horizontal direction and the free passage section to the direction which goes to an ink feed hopper. Therefore, as shown in drawing 6 , where the ink stowage container 201 is connected, the gas-liquid interface L in an absorber 140 (interface of ink and a gas) serves as the direction of a grain direction F1 which becomes main, and an parallel abbreviation horizontal direction. Also when fluctuation by the environmental variation takes place, in order that the gas-liquid interface may maintain an abbreviation horizontal direction, if environmental fluctuation is settled, the gas-liquid interface will return to the location of the original gas-liquid interface L, and dispersion over the gravity direction of a gas-liquid interface will not increase according to the number of cycles of an environmental variation.

[0086] Consequently, in case the ink in the ink stowage container 201 is exhausted and it exchanges for the new ink tank unit 200, since an abbreviation horizontal direction is maintained, even if the turnover rate of the ink tank unit 200 increases the gas-liquid interface, the buffer space 116 does not decrease in number.

[0087] Thus, what is necessary is just to equip more desirably the field of the upper limit of the free passage section (in the case of this operation gestalt, it is the joint pipe 180) as a connection, and the field which includes the upper part from upper limit with the layer which has the array component of main fiber to an abbreviation horizontal direction, in order not to be concern with an environmental change but to stabilize the location of the gas-liquid interface L under vapor-liquid exchange actuation. When it sees from another viewpoint, if this layer should just be in the field which connects a feed hopper 131 and the upper limit section of the free passage section and also it sees from a different viewpoint, this field should just exist on the gas-liquid interface in vapor-liquid exchange actuation. If the latter is caught in operation, the fiber layer which has the directivity of this array makes the gas-liquid interface in an absorber 140 in the liquid supply actuation by vapor-liquid exchange level, and has the function which regulates change of the direction of a vertical of the absorber 140 accompanying the liquid migration from the ink stowage container 201.

[0088] By having such a layer in an absorber 140, a gas-liquid interface L can suppress

dispersion over the gravity direction in this field. In this case, since the longitudinal direction of fiber can be effectively used also to the longitudinal direction in the horizontal cutting plane of an absorber 140 as the array components of main fiber are abbreviation parallel, it is more desirable.

[0089] in addition, here -- the array direction of fiber -- from a vertical -- only -- also coming out -- if it leans -- a theory top -- only -- also coming out -- although above-mentioned effectiveness was done so, clear effectiveness has been checked, when it received horizontally practically and was in the range of about **30 degrees. Therefore, the "abbreviation" for an abbreviation horizontal contains an above-mentioned inclination in this specification.

[0090] Since the array component of a main grain direction consists of upper limit of the free passage section with the same absorber 140 also about the downward field, similarly it consists of these operation gestalten. Therefore, in vapor-liquid exchange actuation as shown in drawing 6 , since it is lost that the gas-liquid interface L differs in a downward field from the upper limit of the free passage section carelessly, ink gas supply pressure failure by an ink piece etc. is not woken up.

[0091] That is, in vapor-liquid exchange actuation, the atmospheric air introduced from the atmospheric-air free passage opening 115 will be distributed along with a main grain direction, if a gas-liquid interface L is reached. Consequently, the interface under vapor-liquid exchange actuation is maintained at an abbreviation horizontal direction, and can be stabilized. Consequently, it is effective in the ability of supplying ink, maintaining the stable negative pressure to carry out more certainly. Moreover, also about vapor-liquid exchange actuation, since a main grain direction is an abbreviation horizontal direction in the case of this operation gestalt, ink is consumed horizontally and almost equally. Consequently, an ink distribution system with few stubs can be offered also about the ink of the negative pressure control room container 110. Therefore, since the ink tank unit 200 which contains a liquid directly like especially this operation gestalt can make effectively the field which does not hold an absorber 130 and the ink in 140 in an exchangeable system, buffer space effectiveness can improve and an ink distribution system strong against an environmental variation can be offered.

[0092] Moreover, when the ink jet head cartlidge of this operation gestalt is what is carried in the so-called printer of a serial type, the carriage by which a both-way scan is carried out is equipped. At this time, the force of the migration direction component of carriage acts on the ink in an ink jet head cartlidge with both-way actuation of carriage. In order to eliminate the bad influence to the ink supply characteristics from the ink tank unit 200 which this force does to the ink jet head unit 160 as much as possible, as for the grain direction of absorbers 130 and 140, and the array direction of the ink tank unit 200 and the negative pressure control room unit 100, it is desirable that it is the direction which goes to the feed hopper 131 of the negative pressure control room container 110 from the joint opening 230 of the ink tank unit 200.

[0093] <Tank wearing actuation> Next, actuation equipped with the ink tank unit 200 is explained to that with which the negative pressure control room unit 100 and the electrode holder 150 were united with reference to drawing 4 .

[0094] Drawing 4 is a sectional view for explaining the actuation which equips with the ink tank unit 200 the electrode holder 150 with which the negative pressure control room unit 100 was attached. It is equipped with the ink tank unit 200 by rotating mostly in the direction of arrow heads F and G along with a crosswise guide (un-illustrating), the pars basilaris ossis occipitalis 151 of an electrode holder 150, the guide section 121 prepared in the negative pressure control room lid 120 of the negative pressure control room unit 100, and the ink tank stop section 155 of electrode-holder 150 posterior part.

[0095] First, the ink tank unit 200 is moved to the ID member 170 for incorrect insertion prevention of the location shown in drawing 4 (a), i.e., the ink tank unit prepared in the negative pressure control room unit 100, as wearing actuation of the ink tank unit 200 to the location where the inclined plane 251 of the ink tank unit 200 contacts. At this time, it has the composition that the joint opening 230 and the joint pipe 180 do not contact. At this time, when it is going to equip with the mistaken ink tank unit 200, an inclined plane 251 and the ID member 170 interfere, and the wearing actuation of the ink tank unit 200 after this is prevented. Thus,

since the joint opening 230 and the joint pipe 180 have the composition of not contacting, by constituting the ink jet head cartlidge 70 as above-mentioned the time of incorrect wearing — the color mixture of the ink in the joint section, and ink fixing (component of ink (ex. anion —)) Fixing occurs with the reaction absorbers 130 and 140 of a cation, and unnecessary exchange of the head in the equipment of the ink tank exchange mold by thinking, also when the negative pressure control room unit 100 becomes unusable etc., and an ink tank etc. can be prevented beforehand. Moreover, by forming the ID section of the ID member 250 in an inclined plane, as mentioned above, it becomes possible to check ID by inserting two or more ID members 170 in the crevice for ID where each ID member 170 corresponds mostly at coincidence, and a positive incorrect wearing prevention function can be attained.

[0096] Next, as shown in drawing 4 (b), while the member 170 for ID is inserted in the crevice 252 for ID, the ink tank unit 200 is moved to the negative pressure control room unit 100 side so that the joint pipe 180 may be inserted in the joint opening 230.

[0097] Next, since the ink tank unit 200 with which the position was equipped is formed in the location shown in drawing 4 (c), i.e., the location where the ID member 170 and the crevice 252 for ID correspond, it is further moved to the back by the side of the negative pressure control room unit 200. Furthermore, if the ink tank unit 200 is rotated by the direction of an arrow head G, in contact with a valve element 261, a valve element 261 will be pushed for the point of the joint pipe 180. By this, a valve system opens, the inside of the ink tank unit 200 and the negative pressure control room unit 100 is opened for free passage, and the supply of the ink 300 in the ink tank unit 200 into the negative pressure control room unit 100 is attained. About the detail of the switching action of this valve system, it mentions later.

[0098] Then, the ink tank unit 200 rotates further in the direction of an arrow head G, and the ink tank unit 200 is stuffed into the location shown in drawing 2. Thereby, the back side lower part of the ink tank unit 200 is stopped by the ink tank stop section 155 of an electrode holder 150, and is fixed to the location of the request of the ink tank unit 200 in an electrode holder 150. In this condition, the ID member 170 will move in the direction which secedes from the crevice 252 for ID a little. The energization force to the back (electrode-holder stop section 155 side) for fixing the ink tank unit 200 is given by the energization member 263 in the ink tank unit 200, and the rubber joint section 280 prepared in the perimeter of the joint pipe 180.

[0099] In the ink tank unit 200 which detaches and attaches with rotation actuation as mentioned above, attachment and detachment of the positive ink tank unit 200 without the color mixture of incorrect wearing and ink become possible in the minimum tooth space by the crevice 252 for ID being formed in an inclined plane 251, and the inferior surface of tongue of the ink tank unit 200 inclining.

[0100] Thus, when connecting the ink tank unit 200 and the negative pressure control room unit 100, ink will move until a pressure with the inside of the negative pressure control room unit 100 and the ink stowage container 201 becomes equal, and as shown in drawing 4 (d), the pressure in the joint pipe 180 and the joint opening 230 will be in equilibrium in the condition of becoming negative (this condition is called a "beginning-of-using condition").

[0101] Then, the ink migration for being in this equilibrium is explained to a detail.

[0102] If the valve system prepared in the joint opening 230 of the ink stowage container 201 by being equipped with the ink tank unit 200 opens, an ink stowage will be in a substantial sealing condition except for the joint opening 230. Then, the ink in the ink stowage container 201 flows to the joint opening 230, and ink pass is formed between the absorbers 140 of the negative pressure control room unit 100. If ink pass is formed, the ink migration to an absorber 140 from the ink stowage container 201 will be started by the capillary force of an absorber 140, consequently the interface of the ink in an absorber 140 will go up. Moreover, PE liner 220 tends to begin deformation from the center section of the field of area max in the direction in which the volume in PE liner 220 decreases.

[0103] Here, a case 210 comes to generate the negative pressure according to the degree of deformation, without the applied force of deformation by ink consumption and the applied force which is going to return to the configuration of the condition before wearing (initial state shown in drawing 4 (a) of this operation gestalt - drawing 4 (c)) working, and carrying out an abrupt

change, as for PE liner 220 in order to serve to control the variation rate of the corner of PE liner 220. Since the space of a case 210 and PE liner 220 is open for free passage in the open air through the open air free passage opening 222, according to the above-mentioned deformation, air is introduced between a case 210 and PE liner 220.
[0104] In addition, if ink pass is formed because the ink in the ink stowage container 201 contacts an absorber 140 even if air exists in the joint opening 230 and the joint pipe 180, since PE liner 220 will deform with derivation of ink, the air is easily movable into PE liner 220.
[0105] Ink migration is performed until ****** in the joint opening 230 of the ink stowage container 201 and ****** in the joint pipe 180 of the negative pressure control room unit 100 become equal.
[0106] As explained above, migration of the ink from the ink stowage container 201 in connection between the ink stowage container 201 and the negative pressure control room unit 100 to the negative pressure control room unit 100 is performed without introducing the gas which minded [ink / 201] absorbers 130 and 140. What is necessary is just to set up ****** of each ** when being in equilibrium so that ink may serve as a suitable value from liquid regurgitation record means, such as the ink jet head unit 160 connected to the ink feed hopper of the negative pressure control room unit 100, according to the class of a liquid regurgitation record means to connect, as there is no leakage appearance.
[0107] Moreover, since dispersion in the amount of ink held before connection at an absorber 130 exists, even when equilibrium is reached, the field where an absorber 140 is not filled up with ink may remain. This field can be used as a buffer area.
[0108] On the contrary, when there is a possibility that the pressure within the joint pipe 180 when reaching an equilibrium state and the joint opening 230 may just become under the effect of the amount of dispersion, the below-mentioned suction recovery means form in the body of a liquid regurgitation recording device may perform suction recovery, and you may correspond by making some ink flow out.
[0109] As mentioned above, after it inserts aslant the ink tank unit 200 of this operation gestalt where the outsole side is put on the ink tank stop section 155 of an electrode holder 150, and it overcomes the ink tank stop section 155, an electrode holder 150 is equipped with it with abbreviation rotation actuation of pushing into the base of an electrode holder 150. Moreover, the ink tank unit 200 is removed from an electrode holder 150 by this reverse actuation. And the switching action of the valve system prepared in the ink tank unit 200 is performed with attachment-and-detachment actuation of this ink tank unit 200.
[0110] <Switching action of a valve system> Below, the switching action of a valve system is explained with reference to drawing 5 (a) - (e).
[0111] Drawing 5 (a) shows the condition just before the ink tank unit 200 ****s the joint opening 230 downward [slanting], being aslant inserted in an electrode holder 150 and inserting the joint pipe 180 in the joint opening 230.
[0112] Here, while projection 180a for seals is prepared in the peripheral face in one over the perimeter at the joint pipe 180, projection 180b for valve-opening close is prepared at the tip. Projection 180a for seals contacts the joint-seal side 260 of the joint opening 230, when the joint pipe 180 is inserted in the joint opening 230, and it is aslant prepared so that the distance from the tip of the joint pipe 180 in the upper limit section may become large rather than that in the lower limit section.
[0113] Since projection 180a for seals slides to the joint-seal side 260 at the time of attachment-and-detachment actuation of the ink tank unit 200 so that it may mention later, it is desirable that the good ingredient of sliding nature with the joint-seal side 260 and adhesion is used. Moreover, especially the gestalt of the energization member 263 which energizes a valve element 261 to the 1st valve-yoke 260a side is not limited, and can use a spring member like coiled spring or flat spring, or the member which has elasticity like rubber. Moreover, it is desirable when it is made the elastic member which will consist of resin if recycle nature is taken into consideration.
[0114] In the condition which showed in drawing 5 (a), projection 180b for valve-opening close does not contact a valve element 261, but the seal section formed in the periphery of the joint

pipe 180 side-edge section of a valve element 261 is pressed by the energization force of the energization member 263 at the seal section of 1st valve-yoke 260a. Thereby, the airtightness inside the ink tank unit 200 is maintained.

[0115] If the ink tank unit 200 is further inserted in an electrode holder 150 and it goes, the seal of the joint-seal side 260 of the joint opening 230 will be carried out by projection 180a for seals. Under the present circumstances, since projection 180a for seals is aslant prepared as mentioned above First, as shown in drawing 5 (b), the lower limit section of projection 180a for seals contacts the joint-seal side 260. As the contact range spreads toward the upper part of projection 180a for seals gradually, sliding to the joint-seal side 260 with insertion actuation of the ink tank unit 200 and it is finally shown in drawing 5 (c) The upper limit section of projection 180a for seals contacts the joint-seal side 260. The perimeter of seal projection 180a contacts the joint-seal side 260 by this, and the seal of the joint opening 230 is carried out by projection 180a for seals.

[0116] Moreover, in the condition which showed in drawing 5 (c), projection 180b for valve-opening close does not contact a valve element 261, and the valve system is not open. Therefore, since the seal of the joint opening 230 is made before a valve system opens, the ink leakage from the joint opening 230 under wearing actuation of the ink tank unit 200 is prevented.

[0117] Furthermore, the air in the joint opening 230 is discharged from the clearance between projection 180a for seals, and the joint-seal side 260 until the seal of the joint opening 230 by projection 180a for seals is made, since the seal of the joint opening 230 is gradually made from the joint-seal side 260 bottom as mentioned above. Thus, by discharging the air in the joint opening 230, the amount of the air which remains in the joint opening 230 where the seal of the joint opening 230 is carried out becomes the minimum, and too much compression of the air in the joint opening 230 by invasion into the joint opening 230 of the joint pipe 180, i.e., too much rise of the pressure in the joint opening 230, is prevented. Consequently, the outflow of the ink into the aperture of the unprepared valve accompanying the rise of the pressure in the joint opening 230 before an electrode holder 150 is completely equipped with the ink tank unit 200, and the joint opening 230 by this can be prevented.

[0118] If the ink tank unit 200 is inserted further, as shown in drawing 5 (d), while the seal of the joint opening 230 by projection 180a for seals had been made, projection 180b for valve-opening close will resist the energization force of the energization member 263, and will push in a valve element 261. While opening 260c of 2nd valve-yoke 260b is open for free passage with the joint opening 230 and the air in the joint opening 230 is introduced into the interior of the ink tank unit 200 through opening 260c by this, the ink in the ink tank unit 200 is supplied to the negative pressure control room container 110 (refer to drawing 2) through opening 260c and the joint pipe 180.

[0119] Thus, by the air in the joint opening 230 being introduced in the ink tank unit 200, when it equips with the ink tank unit 200 in the middle of use again, the negative pressure in PE liner 220 (refer to drawing 2) is eased. Therefore, the balance of the negative pressure of the negative pressure control room container 110 and PE liner 220 is improved, and aggravation of the re-supply nature of the ink to the negative pressure control room container 110 can be prevented.

[0120] As the ink tank unit 200 is stuffed into the base of an electrode holder 150 after the above actuation and it is shown in drawing 5 (e), by equipping an electrode holder 150 with the ink tank unit 200, the joint opening 230 and the joint pipe 180 are connected completely, and the vapor-liquid exchange which mentioned above is in the condition of being carried out certainly.

[0121] With this operation gestalt, it is the pars-basilaris-ossis-occipitalis side of an ink tank, and opening 260c is prepared in 2nd valve-yoke 260b near the valve-yoke seal section 264. According to the configuration of this opening 260c, it is pressed at the time 261 of valve-system open, i.e., a valve element, by projection 180b for valve-opening close, and supply is immediately started [at an operculum 262 side] for the ink in the ink tank unit 200 immediately after migration to the negative pressure control room unit 100, and the ink residue in the ink tank at the time of ink using up can be made into min.

[0122] Moreover, in this operation gestalt, the elastomer was used as an ingredient which

constitutes the joint-seal side 260 of 1st valve-yoke 260a, i.e., the seal section of the 1st valve yoke. Thus, according to the elastic force of the elastomer, positive seal nature with projection 180a for seals of the joint pipe 180 can be secured in respect of [260] a joint seal by using an elastomer as a component, and positive seal nature with the seal section of a valve element 261 can be secured in the seal section of 1st valve-yoke 260a. By giving the elastic force beyond elastic force indispensable securing the seal nature between 1st valve-yoke 260a and the joint pipe 180 moreover to an elastomer (for example, the thickness of an elastomer being increased), axial Bure of the joint pipe connection place in the case of the serial scan scan of an ink jet head cartlidge and **** can be stopped by bending of an elastomer, and a more reliable seal can be performed. Furthermore, the above effectiveness is acquired, without 1st valve-yoke 260a and really being able to fabricate the elastomer used as a component, and increasing components. Moreover, the part using an elastomer as a component is not restricted to the above-mentioned configuration, and an elastomer may be used for it as the component of projection 180a for seals formed in the joint pipe 180, and a component of the seal section of a valve element 261.

[0123] On the other hand, if the ink tank unit 200 is removed from an electrode holder 150, discharge of the seal of the joint opening 230 and actuation of a valve system will be performed in order contrary to the actuation mentioned above.

[0124] That is, if it draws out from an electrode holder 150, making the reverse sense rotate the ink tank unit 200 with the time of wearing, when a valve element 261 moves forward according to the energization force of the energization member 263 and the seal section of a valve element 261 is first pressed by the seal section of 1st valve-yoke 260a, the joint opening 230 will be closed by the valve element 261.

[0125] Then, the seal of the joint opening 230 by projection 180a for seals is canceled by drawing out the ink tank unit 200 further. Thus, since, as for the joint opening 230, a seal is canceled after closing of a valve system, supply of the useless ink to the joint opening 230 is prevented.

[0126] Furthermore, since projection 180a for seals is prepared aslant as mentioned above, discharge of the seal of the joint opening 230 is performed from the upper limit section of projection 180a for seals. Since the upper limit section of projection 180a for seals is opened wide first and the seal of the lower limit section is still carried out although ink remains in the interior of the joint opening 230 and the joint pipe 180 before the seal of the joint opening 230 is canceled, ink does not leak from the joint opening 230. And since the interior of the joint opening 230 and the joint pipe 180 is in the condition of negative pressure, if the upper limit section of projection 180a for seals is opened wide, atmospheric air will enter in the joint opening 230 from there, and the ink which remains in the joint opening 230 and the joint pipe 180 will be drawn in the negative pressure control container 110.

[0127] Thus, in case the seal of the joint opening 230 is canceled, the upper limit section of projection 180a for seals is made to open wide previously, and the leakage of the ink from the joint opening 230 when removing the ink tank unit 200 from an electrode holder 150 is prevented by moving the ink which remained in the joint opening 230 to the negative pressure control container 110.

[0128] Since the seal of the joint opening 230 is made according to the connection structure of the ink tank unit 200 and the negative pressure control container 110 in this operation gestalt before the valve system of the ink tank unit 200 operates as explained above, the leakage of the unprepared ink from the joint opening 230 can be prevented. And the leakage of the ink which remained to actuation of the unprepared valve element 261 at the time of connection and the joint opening 230 at the time of removal can be prevented by preparing time difference in seal timing and its discharge timing in the upper part and the lower part at the time of connection of the ink tank unit 200, and removal.

[0129] Moreover, with this operation gestalt, since the valve element 261 is arranged at back from the opening edge of the joint opening 230 and this valve element 261 is operated by projection 180b for valve-opening close at the tip of the joint pipe 180, the dirt in the ink which a user did not touch a valve element 261 directly and adhered to the valve element 261 can be

prevented.
[0130] <Attachment-and-detachment actuation of the joint section and relation of ID> Next, attachment-and-detachment actuation of the joint section and the relation of ID are explained using drawing 4 and drawing 5 . Drawing 4 and drawing 5 are drawings showing the process in which an electrode holder 150 is equipped with the ink tank unit 200, respectively, (a) of drawing 4 , (b), (c), and (a) of drawing 5 , (b) and (c) are the same stages, drawing 4 shows the condition of ID and drawing 5 shows the detail of the joint section.
[0131] First, wearing actuation is performed to the location where two or more ID members 170 for incorrect insertion prevention of the location 200 shown in drawing 4 (a) and drawing 5 (a), i.e., the ink tank unit prepared in the negative pressure control room unit 100, and the inclined plane 251 of an ink tank contact. At this time, it has the composition that the joint opening 230 and the joint pipe 180 do not contact. At this time, when it is going to equip with the mistaken ink tank unit, said inclined plane 251 and said ID member 170 interfere, and wearing of the ink tank unit beyond it is prevented. Since the joint opening 230 and the joint pipe 180 do not contact by any means as above-mentioned according to this configuration, at the time of incorrect wearing, in the joint section, ink can carry out color mixture or can prevent beforehand ink fixing, the non-regurgitation, an image defect, equipment failure, and unnecessary exchange of the head in the equipment of an ink tank exchange mold.
[0132] Next, since the ink tank unit 200 with which the right location was equipped is formed in the location shown in drawing 4 (b) and drawing 4 (b), i.e., the location where said ID member 170 and the crevice 252 for ID correspond, it is further equipped to the back (negative pressure control room unit 200 side). As for the ink tank unit 200 with which it was equipped to this location, the lower limit section of projection 180a for seals of the joint opening 230 and the joint pipe 180 contacts the sealing surface 260 of the joint opening 230.
[0133] Hereafter, the joint section is connected as the above-mentioned process, and the inside of the ink tank unit 200 and the negative pressure control room unit 100 is opened for free passage.
[0134] In the above-mentioned operation gestalt, although projection 180a for seals is prepared in the joint pipe 180 in one, projection 180a for seals and the joint pipe 180 may be making the heights or the crevice which consisted of another objects and was established in the perimeter of the joint pipe 180 carry out abbreviation engagement of the projection 180a for seals, and the configuration that projection 180a for seals can carry out movable [of the perimeter of the joint pipe 180] is sufficient as them. However, in case an electrode holder 150 is equipped with the ink tank 200, the movable range of projection 180a for seals is designed so that valve element closing motion projection 180b may not contact a valve element 261, until projection 180a for seals of movable within the limits contacts the joint-seal side 260 completely.
[0135] The process in which an electrode holder 150 is equipped with the ink tank unit 200 With the above-mentioned operation gestalt, the lower limit section of projection 180a for seals contacts the joint-seal side 260. Although the contact range showed gradually breadth and that the upper limit section of projection 180a for seals finally contacted the joint-seal side 260 toward the upper part of projection 180a for seals, sliding to the joint-seal side 260 with insertion actuation of the ink tank unit 200 The upper limit section of projection 180a for seals contacts the joint-seal side 260. It goes to the lower part of projection 180a for seals gradually, sliding to the joint-seal side 260 with insertion actuation of the ink tank unit 200. The contact range Breadth, Finally the lower limit section of projection 180a for seals may contact the joint-seal side 260, and the lower limit section and the upper limit section may contact coincidence. Even if the air which exists between the joint pipe 180 and a valve element 261 pushes in a valve element 261 in that case and a valve element 261 opens, since the seal of the joint opening 230 is completely carried out to projection 180a for seals in respect of [260] the joint seal, the ink 300 in a stowage container 201 does not begin to leak outside. Namely, it is that, as for the point of this invention, a valve system is wide opened after the seal of the joint pipe 180 and the joint opening 230 is carried out completely, and according to this configuration, the ink 300 in an ink tank does not begin to leak outside at the time of wearing of the ink tank unit 200. Furthermore, in order that the pushed-in air may enter in the ink tank unit 200 and may extrude the ink 200 in

the ink stowage container 201 to the joint opening 230, ink supply to an absorber 140 from the ink stowage container 201 is performed promptly.
[0136] <Ink supply actuation> Next, supply actuation of the ink in the ink jet head cartlidge shown in drawing 2 is explained with reference to drawing 6 . Drawing 6 is a sectional view for explaining supply actuation of the ink in the ink jet head cartlidge shown in drawing 2 .
[0137] As mentioned above, divide the absorber in the negative pressure control room unit 100 into two or more members, and by arranging the interface of the divided members up in a posture at the time of use from the upper limit of the joint pipe 180 In the case where ink exists in the both sides of absorbers 130 and 140 in the ink jet head cartlidge shown in drawing 2 , after consuming the ink in the upper absorber 130, it becomes possible to consume the ink in the downward absorber 140. Moreover, when changing a gas-liquid interface L by the environmental variation, after filling up near the interface 113c with an absorber 140 and absorbers 130 and 140 first, ink advances into an absorber 130. Therefore, in accordance with the grain direction of an absorber 140, buffer areas other than buffer space 116 in the negative pressure control room unit 100 are stably securable. Furthermore, the ink in the upper absorber 130 can be certainly consumed like this operation gestalt at the time of use by making the strength of the capillary force of an absorber 140 relatively higher than the capillary force of an absorber 130.
[0138] Furthermore, in addition, in the case of this operation gestalt, by pushing the absorber 130 on the absorber 140 side with the rib of the negative pressure control room lid 120, the pressure welding of an absorber 130 and the absorber 140 is carried out by interface 113c, as compared with other parts, compressibility is high and capillary force is in the strong condition in the part near the interface 113c of absorbers 130 and 140, respectively. That is, if capillary force in which the field near the interface 113c of interface 113c of P2, an absorber 130, and 140 comrades and absorbers 130 and 140 (boundary layer) has the capillary force of P1 and an absorber 130 for the capillary force of an absorber 140 is set to PS, it is P2<P1<PS. Thus, since there is capillary force which fills the above-mentioned conditions with preparing the strong boundary layer of capillary force to an interface even if the capillary force range in consideration of dispersion in roughness and fineness of P1 and P2 overlaps by dispersion in the roughness and fineness in an absorber 130 and 140, effectiveness which was mentioned above can be certainly done so. Moreover, since it becomes possible to keep stable the oil level at the time of vapor-liquid exchange in this location by arranging the joint pipe 180 near the lower part of interface 113c of absorbers 130 and 140 as mentioned above, it is desirable.
[0139] Then, the approach for constituting interface 113c in this operation gestalt is explained. In the case of this operation gestalt, as a component of the absorber 140 which is a capillary force generating member, capillary force P1=-1080Pa olefin system resin fiber (2 deniers) is used, and the hardness is 6.76Ns/mm. Here, the hardness of absorbers 130 and 140 measures the repulsive force when stuffing a phi15mm push rod into an absorber in the condition of having been contained in the negative pressure control room container 110, and is called for with the inclination of the repulsive force over the amount of pushing. On the other hand, as a component of an absorber 130, although olefin system ****** of an absorber 140 and this ingredient was used, 130 absorberP2 is weak compared with the absorber 140, it is the capillary force P2=-785Pa, and the rigidity of an absorber 130 has become [the diameter of fiber of the textile materials] thick (6 deniers) highly [Ns / // mm and / 18.4].
[0140] Thus, the weak absorber 130 of capillary force is hardened to the high absorber 140 of capillary force, near interface 113c of an absorber 130 and 140 comrades, the direction of an absorber 140 will collapse in carrying out the pressure welding of those absorbers 130 and 140, and combining them, and the strength of capillary force can be set to P2<P1<PS by it. Furthermore, the difference of P2 and PS can surely be carried out to beyond the difference of P2 and P1.
[0141] <Ink consumption actuation> Next, the outline of ink consumption actuation after equipping the negative pressure control room unit 100 and an electrode holder 150 with the ink tank unit 200 until the ink in the ink absorption container 201 is consumed is explained with reference to drawing 6 - drawing 8 . Drawing 7 is drawing for explaining the condition of the ink in the ink consumption actuation explained based on drawing 6 , and drawing 8 is drawing for the

ink consumption actuation to explain the depressor effect of the internal pressure fluctuation by deformation of PE liner 220.

[0142] First, if the ink stowage container 201 is connected to the negative pressure control room unit 100 as mentioned above, the ink in the ink stowage container 201 moves into the negative pressure control room unit 100, and will be in a beginning-of-using condition until a pressure with the inside of the negative pressure control room unit 100 and the ink stowage container 201 becomes equal. Next, the ink held to the both sides of an absorber 140 is consumed in PE liner 220, maintaining balance in the direction in which the value of ****** which the both sides of an absorber 140 generate in PE liner 220 increases, if consumption of ink is started by the ink jet head unit 160 (the 1st ink supply condition: the field A of drawing 7 (a)). Here, when ink is held at the absorber 130, the ink of an absorber 130 is also consumed. In addition, drawing 7 (a) is drawing for explaining an example of the rate of the negative pressure change in the ink supply pipe 165 at this time, in drawing 7 (a), an axis of abscissa is the amount of ink derivation from the ink supply pipe 165 to the exterior of the negative pressure control room container 110, and an axis of ordinate is the value of the negative pressure in the ink supply pipe 165 (******).

[0143] next, while absorbers 130 and 140 maintain a gas-liquid interface L by a gas being introduced in PE liner 220, pass the vapor-liquid exchange condition (the 2nd ink supply condition: the field B of drawing 7 (a)) of holding the negative pressure of about 1 law to derivation of ink — it comes (the field C of drawing 7 (a)) to consume the ink which remains in the capillary force generating member receipt room 10.

[0144] Thus, since the ink jet head cartlidge of this operation gestalt has the process which uses the ink in PE liner 220, without introducing the open air into PE liner 220, in this ink supply process (1st ink supply condition), a limit of the content volume of the ink stowage container 201 should take into consideration only the air introduced in PE liner 220 at the time of association. Consequently, even if it eases a limit of the content volume of the ink stowage container 201, there is an advantage that it can respond to environmental variations, such as a temperature change.

[0145] Moreover, even if it exchanges the ink stowage container 201 in which condition of the above-mentioned fields A, B, and C in drawing 7 (a), negative pressure can be generated stably and, thereby, positive ink supply actuation can be performed. That is, according to the ink jet head cartlidge of this operation gestalt, the ink in the ink stowage container 201 can be consumed nearly completely. Moreover, since it may not come out so much, air may be included in the joint pipe 180 or the joint opening 230 at the time of exchange of the ink tank unit 200, and it is not based on the amount of ink maintenance of absorbers 130 and 140 but exchange of the ink stowage container 201 can be performed, even if it does not necessarily establish a residue detection device, an exchangeable ink jet head cartlidge is obtained in the ink stowage container 201.

[0146] Here, still more nearly another viewpoint at drawing 7 (b) explains the actuation in a series of ink consumption processes in which it explained above.

[0147] Drawing 7 (b) is drawing for explaining an example of the actuation in a series of ink consumption processes, in drawing 7 (b), an axis of abscissa is time amount and axes of ordinate are the amount of ink derivation from an ink stowage, and the amount of air installation into PE liner 220. Moreover, in elapsed time, the ink amount of supply to the ink jet head unit 160 presupposes that it is fixed.

[0148] The actuation in a series of ink consumption processes in the viewpoint of the amount of ink derivation shown in drawing 7 (b) and the amount of air installation is explained. In drawing 7 (b), the amount of ink derivation from PE liner 220 is shown by continuous-line **, and the amount of air installation to an ink stowage is shown by continuous-line **.

[0149] Time amount t= 0 to time amount t=t1 is equivalent to the field A before the vapor-liquid exchange shown in drawing 7 (a). In this field A, ink is drawn from a head, maintaining the balance out of PE liner 220 from an absorber 140, as mentioned above.

[0150] Next, time amount t=t1 to time amount t=t2 is equivalent to the vapor-liquid exchange field (area B) of drawing 7 (a). In this field B, vapor-liquid exchange is performed based on

negative pressure balance which was mentioned above. As continuous-line ** of drawing 7 (b) shows, ink is drawn from the inside of PE liner 220 by what air is introduced for in PE liner 220 (shown by the level difference of continuous-line **). After necessarily not drawing immediately the ink of an amount equal to the air introduced with installation of air on that occasion from the inside of PE liner 220, for example, passing through a certain predetermined time amount from installation of air, finally the ink of an amount equal to the introduced air is drawn from the inside of PE liner 220. Such actuation does not have PE liner 220, but a gap of timing produces it compared with actuation of the ink tank which an ink stowage does not deform so that clearly also from this drawing 7 (b). In a vapor-liquid exchange field, this actuation is repeated as mentioned above. If derivation of the ink in PE liner 220 progresses, the amount of the air in PE liner 220 and the amount of ink will be reversed at a certain time.

[0151] If it passes over time amount t=t2, it will become a field (field C) after the vapor-liquid exchange shown in drawing 7 (a). In this field C, as mentioned above, the inside of PE liner 220 becomes atmospheric pressure mostly. In connection with it, it becomes the actuation which returns to an initial state (condition before the beginning of using) according to the elastic force of PE liner 220. However, in PE liner 220, it has not returned to an early condition completely by the so-called buckling. Therefore, the final amount Vc of air installation into PE liner 220 serves as (V>Vc). All the ink from PE liner 220 will be in the condition of using up, also in Field C.

[0152] It is the pressure fluctuation under vapor-liquid exchange (a comparatively large thing is raised compared with the ink tank system by which ****** j in drawing 7 (a) performs the conventional vapor-liquid exchange.) as a description of the phenomenon of vapor-liquid exchange actuation [in / as explained above / the configuration of the ink jet head cartlidge of this operation gestalt].

[0153] As this reason, before performing vapor-liquid exchange, PE liner 220 will be deformed into the method of the inside of a tank by derivation of the ink out of PE liner 220. Therefore, the force of always going to the method of outside by the wall of PE liner 220 according to the elastic force of PE liner 220 is working. Therefore, in order to make differential pressure with the inside of an absorber 140 and PE liner 220 ease at the time of vapor-liquid exchange, the amount of the air which enters in PE liner 220 enters in many cases more than the specified quantity, as mentioned above. It is in the inclination for derivation of the ink to the negative pressure control room unit 100 out of PE liner 220 to also increase by that cause. When the interior of the ink tank unit 200 makes it the configuration which has an ink stowage which a wall does not deform like PE liner 220 to it, and the air of the specified quantity goes into the ink stowage, ink is drawn immediately to the negative pressure control room unit 100.

[0154] For example, when printing duty (solid mode) 100%, a lot of ink is breathed out at once from the ink jet head unit 160. In the ink jet head cartlidge of this operation gestalt, although derivation of ink is rapidly performed by this also from the inside of the negative pressure control room unit 100 and the ink stowage container 201, since there is comparatively much derivation of the ink by vapor-liquid exchange, there are no worries about an ink piece and dependability improves.

[0155] Moreover, since according to the configuration of the ink jet head cartlidge of this operation gestalt derivation of ink is performed after PE liner 220 has deformed into the inner direction, there is further advantage that the buffer effectiveness over vibration of carriage etc. and the external factor by an environmental variation etc. is high.

[0156] As explained above, although the ink jet head cartlidge of this operation gestalt can ease minute negative pressure fluctuation with PE liner 220, according to the configuration, it becomes possible [dealing with change of environments, such as a temperature change,] further by the solution approach which is different from the conventional approach when it includes air in PE liners 220, such as the 2nd ink supply condition.

[0157] Next, when changing the environmental condition of an ink jet head cartlidge shown in drawing 2 , a liquid is explained with reference to drawing 8 about the mechanism stabilized and held within the unit. In the following explanation, absorbers 130 and 140 are also called a capillary force generating member.

[0158] The wall which constitutes PE liner 220 by reduction of atmospheric pressure or the rise

of atmospheric temperature if the air in PE liner 220 expands, and the oil level in PE liner 220 are pressed. Thereby, while the content volume of PE liner 220 increases, some ink in PE liner 220 flows out of the inside of PE liner 220 into the negative pressure control room container 110 through the joint opening 230 and the joint pipe 180. Here, since the content volume of PE liner 220 increases, the amount of ink which flows into an absorber 140 decreases sharply compared with the case where the part by which ink is contained cannot deform.

[0159] The amount of ink which flows out into the negative pressure control room container 110 through the joint opening 230 and the joint pipe 180 here When an allobar is rapid, in order to ease the negative pressure in PE liner 220 and to make the content volume of PE liner 220 increase, The drag force of the wall surface produced by easing the deformation to a way among the walls of PE liner 220, the drag force for moving ink and making a capillary force generating member absorb, and the effect of ** are dominant in first stage.

[0160] Especially, since ****** of a capillary force generating member (absorbers 130 and 140) is larger than the resistance to restoration in a bag in this configuration, the content volume of PE liner 220 increases first with expansion of air. And when the increment in the volume by expansion of air is larger than the upper limit of this increment, ink comes to flow out of the inside of PE liner 220 into the negative pressure control room container 110 side through the joint opening 230 and the joint pipe 180. That is, in order that the wall surface in PE liner 220 may achieve the function as a buffer to an environmental variation, migration of the ink in said capillary force generating member becomes loose, and the negative pressure property in about 165 ink supply pipe is stabilized.

[0161] In addition, with this operation gestalt, the ink which flowed into the negative pressure control room container 110 is made to be held by said capillary force generating member. In this case, although it becomes the internal pressure by the side of forward a little like the early stages of use more temporarily than the stationary phase of ink internal pressure since the amount of ink of the negative pressure control room container 110 increases temporarily and a gas-liquid interface goes up, the effect of the regurgitation property on liquid regurgitation record means, such as the ink jet head unit 160, is small, and there is no problem on real use. Moreover, when it recovers on the level before an atmospheric pressure decompressing (it returns to one atmospheric pressure), while the ink which leaked out in the negative pressure control room container 110, and was held at said capillary force generating member returns in PE liner 220 again (or when it returns to the original temperature), the content volume of PE liner 220 comes to return to the original condition.

[0162] Next, the principle actuation when resulting in a steady state after the first stage-actuation after an allobar under the atmospheric pressure which changed is explained.

[0163] In this condition, a characteristic thing is that the interface of the ink currently held at said capillary force generating member changes, as balance is maintained to fluctuation of the negative pressure by change of the content volume of not only the amount of ink drawn from the inside of PE liner 220 but PE liner 220 the very thing. Here about the relation of the ink absorbed amount of said capillary force generating member and the ink stowage container 201 in this invention The ink flow under the worst conditions from the ink stowage container 201 from a viewpoint of preventing the leakage of the ink from the above-mentioned reduced pressure or atmospheric-air free passage opening at the time of a temperature change, What is necessary is to decide the maximum ink absorbed amount of the negative pressure control room container 110 in consideration of the amount of ink made to hold in the negative pressure control room container 110 at the time of the ink supply from the ink stowage container 201, and to give only the volume which contains the capillary force generating member of the part at least to the negative pressure control room container 110.

[0164] Dotted-line ** showed these relation by setting an axis of ordinate (Y) as the ink flow at the time of decompressing the initial spatial body product (volume of air) in PE liner 220 before reduced pressure in case the inside of PE liner 220 does not deform into drawing 8 (a) at all to expansion of air on an axis of abscissa (X), and decompressing an atmospheric pressure in P atmospheric pressure ($0< P<1$).

[0165] Therefore, the estimate in the worst conditions of the ink flow out of PE liner 220 For

example, when the maximum reduced pressure conditions of atmospheric pressure are made into 0.7 atmospheric pressures, that the ink flow from the ink stowage container 201 serves as max is the case where 30% of ink of the volume VB of PE liner 220 is carrying out the remainder into PE liner 220. What is necessary is just to think that all the ink (30% of VB) that is carrying out the remainder to PE liner 220 leaks out, if the ink below the PE liner 220 wall lower limit section is also absorbed by the capillary force generating member of the negative pressure control room container 110.

[0166] On the other hand, with this operation gestalt, since the inside of PE liner 220 deforms to expansion of air, while the content volume of PE liner 220 after expansion increases to the content volume of PE liner 220 before expansion, the ink holding level in the negative pressure control room container 110 changes so that balance may be maintained to fluctuation of the negative pressure by the deformation in this PE liner 220. And in a steady state, it comes to maintain the balance of negative pressure with the capillary force generating member to which negative pressure decreased compared with atmospheric-pressure fluctuation before in the ink out of PE liner 220. That is, only the amount of expansion of the amount of ink derivation in PE liner 220 decreases. Consequently, continuous-line ** came to have shown as an example. The estimate in the worst conditions of the ink flow out of PE liner 220 can be made smaller than the case where the inside of PE liner 220 does not deform at all to expansion of air so that clearly also from this dotted-line ** and continuous-line **. Also in the case of the temperature change of an ink tank, the above-mentioned phenomenon is the same, but even if an about 50-degree temperature rise occurs, there are few flows than the time of the above-mentioned reduced pressure.

[0167] Thus, expansion of the air in the ink stowage container [according to the ink tank of this invention] 201 by environmental change Since the ink stowage container 201 is also permissible with the buffer effectiveness of making the volume of ink stowage container 201 the very thing increasing until the appearance configuration in PE liner 220 becomes equal substantially with the configuration of case 210 inside not only by the negative pressure control room container 110 but by max Even if it increases sharply the amount of ink receipt of the ink stowage container 201, the ink distribution system which can respond to an environmental variation can be offered.

[0168] Moreover, when the volume of early air is set to VA1, the content volume of the amount out of PE liner 220 accompanying the passage of time at the time of changing the environment of a tank from under atmospheric pressure by t= 0 to the bottom of the reduced pressure environment of P atmospheric pressure (0< P<1) of ink derivation and PE liner 220 is typically shown in drawing 8 (b). In drawing 8 (b), an axis of abscissa is time amount (t), an axis of ordinate is the content volume of the amount out of PE liner 220 of ink derivation, and PE liner 220, it is continuous-line ** about time amount change of the amount out of PE liner 220 of ink derivation, and continuous-line ** shows time amount change of the volume in PE liner 220.

[0169] As shown in drawing 8 (b), before the negative pressure control room container 110 and the ink stowage container 201 will finally be in the steady state which maintains negative pressure balance to a rapid environmental change, it can respond to expansion of air mainly with the ink stowage container 201. Therefore, the derivation timing of the ink from the ink stowage container 201 to the negative pressure control room container 110 is delayable to a rapid environmental variation.

[0170] Therefore, the ink distribution system which can perform ink supply under the negative pressure conditions stabilized while using the ink stowage container 201 can be offered, heightening the permissible force to gas expansion of the open air introduced by vapor-liquid exchange, even if it is under various operating environments.

[0171] According to the ink jet head cartlidge of this operation gestalt, by choosing suitably the ingredient in the capillary force generating member (ink absorbers 130 and 140) to be used and PE liner 220, it can be decided that it will be arbitration, and a volume rate with the inside of the negative pressure control room container 110 and PE liner 220 can be practically used, even when bigger than 1:2. In thinking the buffer effectiveness in PE liner 220 as important especially, what is necessary is just made to enlarge deformation in PE liner 220 in the vapor-liquid

exchange condition over a beginning-of-using condition within limits with elastic deformation possible in which.
[0172] Thus, according to the ink jet head cartlidge of this operation gestalt, even when a capillary force generating member has only slight occupied volume together with the configuration of the negative pressure control room container 110, effectiveness can be demonstrated in multiplication to the change to an external environment.
[0173] In the ink jet head cartlidge of this operation gestalt, as shown in drawing 2 , the joint pipe 180 is formed more nearly up than the lower limit section of the negative pressure control room container 110. Thereby, the effectiveness of reducing dispersion in the ink component in the absorber 130,140 in the negative pressure control room container 110 is acquired. This effectiveness is explained further below at a detail.
[0174] Although the ink from the ink tank unit 200 is supplied to the ink jet head unit 160 through the joint opening 230 and an absorber 130,140, the path from the joint opening 230 to the ink supply pipe 165 is various. By the rise of the oil level in the absorber 140 by the environmental variation mentioned above, once saying to the upper part of an absorber 140, a remarkable difference appears in the path by what is led to the case where ink is directly supplied by the minimum distance, and the ink supply pipe 165. Thereby, the effect on record may come out by dispersion in an ink component. It enables this to press down dispersion in an ink path, i.e., the difference of path length, and to also press down dispersion in an ink component in locating the joint pipe 180 to the upper part of an absorber 140, like the configuration of the ink jet head cartlidge of this operation gestalt. Thereby, the dispersion component to record can be pressed down. It is desirable to limit to a certain amount of location like this operation gestalt by this, in order to secure buffer ability although it is desirable to, have the joint pipe 180 and the joint opening 230 in the upper part if possible. This location is suitably determined by conditions, such as the amount of supply of an absorber 130,140, ink, and ink, and the amount of ink.
[0175] By the way, in the negative pressure control room container 110 of the ink jet head cartlidge of this operation gestalt, as mentioned above, interface 113c whose capillary force is PS is formed [capillary force / of P1 / the absorber 140 and capillary force] by the absorber 130 of P2 carrying out a pressure welding, and being contained in capillary force. The relation of the strength of each capillary force has a relation that P2<P1<PS, i.e., the capillary force of interface 113c, is the strongest, the capillary force of the arranged absorber 140 is strong subsequently to a lower-berth side, and the capillary force of the absorber 130 arranged on the upper case side is the weakest. I hear that the capillary force of the absorber 130 arranged on the upper case side is the weakest, the capillary force of interface 113c is the strongest, and though the ink supplied from the free passage opening 231 flows into the absorber 130 by the side of an upper case exceeding interface 113c, ink will be strongly pulled to the interface 113c side, and it will return to the direction of interface 113c. Thus, not drawing Rhine where Path's J passes both an absorber 140 and the absorber 130, and the free passage opening's 230 being formed therefore in interface 113c existing, more nearly up than a feed hopper 131, and an interval can make small the difference between the die length of Path K, and the die length of Path J. For this reason, the difference in the effect ink is influenced by the absorber 140 produced when the paths of the ink which flows the inside of an absorber 140 differ can also be made small.
[0176] Moreover, in this operation gestalt, the ink absorber which was contained by the negative pressure control room container 110 and which is a negative pressure generating member has composition of two members. In this operation gestalt, it consists of absorbers 130 and 140 with which capillary force differs, and the strong thing of capillary force is used as a lower absorber. And it is possible to also secure the positive buffer section, pressing down dispersion in an ink path in locating the joint pipe 180 in the lower part near the interface of interface 113c with absorbers 130 and 140.
[0177] Moreover, although the feed hopper 131 showed as an example what was formed near the center of the low wall of the negative pressure control room container 110, a feed hopper may be formed in the side attachment wall of a direction [which was kept away from the free

passage opening 231], i.e., left end of low wall in drawing 2 , side, or left-hand side as long as it is required, without being limited to this. In connection with this, the location of the ink jet head unit 160 established in the electrode holder 150 and the location of the ink supply pipe 165 may also be established in the location corresponding to the feed hopper formed in the side attachment wall of the left end side of a low wall, or left-hand side.

[0178] <Valve system> Next, the valve system prepared in the interior of the joint opening 230 of the ink tank unit 200 mentioned above is explained with reference to drawing 9 .

[0179] The front view of relation with the valve element 261 to which the front view of the relation between 2nd valve-yoke 260b and a valve element 261 and drawing 9 (b) rotated with the sectional side elevation of drawing 9 (a), and drawing 9 (a) rotated drawing 9 (c) with 2nd valve-yoke 260b, and drawing 9 (d) are the sectional side elevations of drawing 9 (d).

[0180] As shown in drawing 3 , and drawing 9 (a) and drawing 9 (b), in order that the opening configuration of the joint opening 230 may raise the supply engine performance of the ink of the ink stowage container 201, it is the shape of a slot prolonged in an one direction, and the opening area of the joint opening 230 is expanded. However, if the aperture width of the joint opening 230 is expanded to a perpendicular longitudinal direction to the longitudinal direction of the joint opening 230, the tooth space which the ink stowage container 201 occupies will increase, as a result it will lead to enlargement of equipment. This inclination has especially effectiveness, when arranging in parallel and arranging an ink tank in a longitudinal direction (carriage scanning direction) with the latest colorization and photograph-izing. For this reason, in this operation gestalt, the configuration of the joint opening 230 which is an ink feed hopper of the ink stowage container 201 was made into the slot.

[0181] Furthermore, in the ink jet head cartlidge of this operation gestalt, the joint opening 230 has the role which supplies ink to the negative pressure control room unit 100, and the role which introduces atmospheric air in the ink stowage container 201. Therefore, it becomes possible [carrying out functional separation easily mainly as an atmospheric-air installation way] about the lower part in the joint opening 230 for the joint opening 230 to serve as a slot configuration which has a longitudinal direction in the perpendicular direction to the gravity direction mainly in the upper part in an ink supply way and the joint opening 230, and it can attain positive ink supply and vapor-liquid exchange.

[0182] As mentioned above, the joint pipe 180 of the negative pressure control room unit 100 is inserted in the interior of the joint opening 230 with wearing of the ink tank unit 200. The ink in the ink stowage container 201 is supplied into the negative pressure control room unit 100 because a valve element 261 is pushed by projection 180b for valve-opening close at joint pipe 180 tip and the valve system of the joint opening 230 opens by it by this. When projection 180b for valve-opening close carries out per **** to valve portion material by the posture in which the joint pipe 180 is equipped with the ink tank unit 200, and the cross-section configuration of the point of projection 180a for seals allotted to the side face of the joint pipe 180 is a hemicycle-like, it is possible to avoid a twist of a valve element 261. In order to enable stable sliding of a valve element 261 at this time, as shown in drawing 9 (a) and drawing 9 (b), path clearance 266 is formed between the joint-seal side 260 of the joint opening 230 inside, and the periphery of the part by the side of 1st valve-yoke 260a of a valve element 261.

[0183] Furthermore, in a part for the point of the joint pipe 180, since the upper part is opened wide at least, when the joint pipe 180 is inserted in the joint opening 230, formation of the main atmospheric-air installation way in the upper part in the joint pipe 180 and the joint opening 230 is not checked, and prompt vapor-liquid exchange actuation is possible.

[0184] On the contrary, as it slides ahead by the side of 1st valve-yoke 260a according to the elastic force which a valve element 261 receives from the energization member 263 when the joint pipe 180 separates from the joint opening 230 at the time of removal actuation of the ink tank unit 200 and is shown in drawing 9 (d), the supply way of ink is intercepted by the valve-yoke seal section 264 of 1st valve-yoke 260a and the valve element seal section 265 of a valve element 261 being engaged.

[0185] Drawing 10 is the perspective view showing an example of the configuration of the point of the joint pipe 180. As shown in drawing 10 , top opening 181a is formed in the upper part in

the point of the joint pipe 180 of a slot configuration, and bottom opening 181b is formed in the part of the lower part in the point. Although bottom opening 181b is an ink path and top opening 181a is for the paths of air, top opening 181a may let ink pass.

[0186] Moreover, even if the difference of inner external pressure arises with the ink stowage container 201 in change of an operating environment as a value of the energization force to 1st valve-yoke 260a of a valve element 261, it is set up so that the energization force of a valve element 261 may be kept almost constant. When a valve element 261 is closed and the ink tank unit 200 is carried under the environment of 1.0 atmospheric pressures after using such an ink tank unit 200 at the high ground of 0.7 atmospheric pressures, the force will commit the inside of the ink stowage container 201 to the valve element 261 in the direction in which a pressure pushes a valve element 261 open by becoming low rather than atmospheric pressure. In the case of this operation gestalt, the force FA in which atmospheric air pushes a valve element 261 is FA=1.01x105 [N/m2]. (1.0 atmospheric pressures)

It becomes.

[0187] Moreover, the force FB in which the gas in an ink tank pushes a valve element 261 is FB=0.709x105 [N/m2]. (0.7 atmospheric pressures)

It becomes. In order to make a valve element 261 always generate the energization force to such an environmental variation, the energization force FV of a valve element 261 needs to fill FV= (FA-FB) >0.

[0188] That is, in this operation gestalt, it becomes FV>1.01x105-0.709x105=0.304x105[N/m2].

[0189] This value is a thing when 1st valve-yoke 260a is engaging with the valve element 261. Since the amount of displacement of the energization member 263 for generating the energization force to a valve element 261 becomes large when a valve element 261 and 1st valve-yoke 260a are separated namely, it is clear the value's of the energization force which energizes a valve element 261 to the 1st valve-yoke 260a side to become still larger.

[0190] In the valve system of such a configuration, there is so-called possibility which it becomes complicated and a phenomenon generates of stroking coefficient of friction increasing [a sliding surface with the valve element 261 of projection 180b for valve-opening close] by fixing of ink etc., and a valve element 261 not sliding on the projection sliding-surface top for valve-opening close in that case, therefore a valve element 261 being made the method of drawing Nakagami with rotation actuation by projection 180b for valve-opening close.

[0191] Then, the gestalt of the valve which becomes complicated (pry) and can take into consideration the effect on the seal engine performance by generating of a phenomenon is described below with the example of a comparison.

[0192] The example of a gestalt for drawing 11 to compare with the valve system of this invention is shown, and drawing 12 and drawing 13 show **** and the seal condition in a valve system of drawing 11 . In the example of a comparison of drawing 11 , the path clearance 506 for sliding between the valve element 501 of a slot configuration and 2nd valve-yoke 500b is a constant rate. A valve element 501 is forced on 1st valve-yoke 500a by the energization member 503, and carries out the seal of the joint opening 530 by adhesion with valve element seal section 501c of the shape of a taper by the side of 2nd valve-yoke 500b of a valve element 501, and seal section 500c of the shape of a taper of 1st valve-yoke 500a. If the above becomes complicated in the structure of such an example of a comparison and a phenomenon occurs, as shown in drawing 12 , a valve element 501 and 2nd valve-yoke 500b will touch by two places, contact surface 510a and contact surface 511b. if distance between this two contact surface is set to X and the amount of path clearance is set to Y — the — it becomes complicated, and angle theta serves as theta=tan -1 (2 Y/X), and is made so small that the distance X between the contact surfaces is large if the amount of path clearance is the same.

[0193] However, in the case of this example of a comparison, since the distance X between the contact surfaces is comparatively (comparing for example, with a valve element diameter) short, it becomes complicated and angle theta is comparatively large [the distance]. since in other words rotation actuation of whenever [big square] was comparatively needed for the correction which becomes complicated, it generated — becoming complicated — it turns out that the probability corrected is low.

[0194] If the contact to 1st frame 500a is again made as shown in drawing 13 while this **** has not been corrected by it, both contact radii will differ in the R section especially in a slot configuration of taper-like valve element seal section 501c and 1st valve-yoke seal section 500c, and the contact section will not stick completely, but ink leakage will occur.
[0195] Moreover, although joining of 2nd valve-yoke 500b and the operculum 502 is carried out ultrasonically, since the operculum of the example of a comparison is a simple flat surface, the location gap by supersonic vibration arises and it has a possibility that the precision of the pin center,large location of the hole of an operculum 502 where sliding shaft 501a of a valve element 501 is inserted may vary. Therefore, it will be necessary to take the large hole of an operculum 502 so that the hole of an operculum 502 and sliding shaft 501a of a valve element 501 may not contact. Since the diameter of min of the energization member 503 is decided by the bore diameter of an operculum 502, it becomes what has the difficult miniaturization of the energization member 503, as a result the difficult miniaturization of the whole device of a valve.
[0196] The valve system of this operation gestalt takes the following configurations to such an example of a comparison. Drawing 14 shows the valve system by the gestalt of operation of this invention, and drawing 15 and drawing 16 show **** and the seal condition in a valve system of drawing 14 . As shown in drawing 14 , with this operation gestalt, as for the valve element 261, the taper is formed in the direction in which a diameter (at least major axis) becomes small toward the stroke direction (drawing Nakamigi sense). The taper is formed in the direction in which a bore becomes large toward the stroke direction the same [the inner circumference section of 2nd valve-yoke 260b]. When a valve element 261 becomes complicated with this configuration, before a very large include angle is required in the location of contact surface 511b of the example of a comparison of drawing 12 for a valve element 261 and 2nd valve-yoke 260b to contact and reaching that include angle, the sliding shaft of a valve element 261 contacts the hole of an operculum 262 (refer to drawing 15). The distance X between the contact surfaces can be set up for a long time by this, consequently it can become complicated, and angle theta can be made small. Compared with the example of a comparison, it becomes complicated, and since it is very small, the adhesion of the valve element seal section 265 and the 1st valve-yoke seal section 264 has angle theta good [therefore,] while **** has not been corrected, as it is shown in drawing 16 , even if a valve element 261 is contacted by 1st frame 500a.
[0197] It merely becomes complicated in this case, and in the distance between the contact surfaces, an angle serves as theta=tan -1 (Y1+Y2/X), when path clearance between the holes of Y1, the sliding shaft of a valve element 261, and operculum 260b is set to Y2 for the path clearance between X, a valve element 261, and 2nd valve-yoke 260b.
[0198] Moreover, while making an operculum 252 advance inside 2nd valve-yoke 260b, operculum joining guide 262a which is the step (the amount of penetration of 0.8mm of an operculum) which can contact the edge of 2nd valve-yoke 260b is prepared in the operculum 252. Therefore, the path of the hole into which the sliding shaft of a valve element 261 goes in an operculum 262 is made smaller than the example of a comparison. That is, by operculum joining guide 262a, since a location gap of the operculum 262 by the vibration at the time of the ultrasonic welding of 2nd valve-yoke 260b and an operculum 262 becomes small, the precision of the pin center,large location of the hole of an operculum 262 can be improved. Since the bore diameter of an operculum 262 can be made small and the diameter of min of the energization member 263 can be made still smaller by this thing, the miniaturization of a valve system can be attained. moreover, the valve element 261 — becoming complicated — even if the force joins an operculum 262 through the sliding shaft of a valve element 261, the rigidity of an operculum 262 is securable with operculum joining guide 262a.
[0199] Furthermore, R section 262b is prepared on the ridgeline of the hole of an operculum 262. This R section 262b is prepared only in the non-joining side side (drawing Nakamigi side) among the ridgelines of a hole. According to this configuration, actuation of the valve element [having become complicated] 261, especially the contact resistance of the sliding shaft of a valve element 261 and operculum 262 in a valve-closing time can be reduced.
[0200] Moreover, the edge contacted the 1st valve-yoke 260a side of a valve element 261 is the

valve element seal section 265 which consists of a flat surface. On the other hand, the part which the valve element seal section 265 of 1st valve-yoke 260a contacts serves as the 1st frame seal section 264 which consists of an elastomer 267 prepared inside 1st valve-yoke 260a. Thus, even if a valve element becomes complicated and contacts by flat-izing a valve element 261 and the seal part of 1st valve-yoke 260a, since the contact radius over 1st frame 260a of the R section of the valve element 261 of an ellipse configuration is in agreement, perfect contact will be made. Furthermore, since the 1st valve-yoke seal section 264 is made into the configuration projected in the shape of a tongue, the seal at the time of the contact becomes a more positive thing.

[0201] Moreover, in attachment-and-detachment actuation of the ink tank unit 200, when the path clearance for sliding is prepared between a valve element 261 and 2nd valve-yoke 260b by the valve system of such a configuration, as shown in drawing 9 (c), a valve element 261 may rotate within 2nd valve-yoke 260b centering on the shaft. However, with this operation gestalt, since the valve-yoke seal section 264 and the valve element seal section 265 will contact in a field even if it is energized by 1st valve-yoke 260a, after the valve element 261 rotated the shaft as a core and has had the maximum angle of rotation, the sealing nature of a valve system is securable.

[0202] Furthermore, since the angle of rotation of a valve element 261 can be minimized and the responsibility of a valve can also raise it to sliding of a valve element 261 by having made the configuration of the joint opening 230 and a valve system into the shape of a slot, it becomes possible to secure the seal nature of the valve system of the joint opening 230. Moreover, when the configuration of the joint opening 230 and a valve system is a slot-like, in attachment-and-detachment actuation of the ink tank unit 200, projection 180for seals a and the valve element 261 which were allotted to the side face of the joint pipe 180 slide promptly within the joint opening 230, and stable connection actuation is performed.

[0203] Moreover, as shown in drawing 10 , the contact edge with the valve element 261 of the joint pipe 180 is vapor-liquid exchange and projection 180b for valve-opening close of two right-and-left opposite which forms top opening 181a and bottom opening 181b for liquid supply. Therefore, as shown in (c) of drawing 17 , and (d), forming two contact ribs 310 corresponding to projection 180b in the part except the 1st frame seal section 264 of the valve element 261 which contacts projection 180b, and the valve element seal section 265 to stick is examined. However, at the time of valve-opening, since a valve element 261 is resisted and put back to the thrust of the energization member 263, the rigidity of extent which the rib part does not deform is searched for. Moreover, it is called for from a viewpoint of dependability that the moment which joins two contact locations focusing on sliding shaft 261a is offset about arrangement and the configuration of the contact rib section even if the location of the contact rib section of a valve element 261 to projection 180b for two valve-opening close of the joint pipe 180 shifts to the circumference of the shaft of sliding shaft 261a of a valve element 261. So, with this operation gestalt, as shown in (a) of drawing 17 , and (b), the rib 311 (for example, width of face of 0.6mm, height of 1.3mm) of the circular ring configuration which is the joint pipe 180 and analog of a slot configuration is formed in the valve element 261. In other words, impression section 311a of a slot configuration is prepared in the center section which is a part except the 1st frame seal section 264 of a valve element 261, and the valve element seal section 265 to stick. By this configuration, the valve element 261 is a thing with the reinforcement and dependability in the case of the contact to projection 180b for valve-opening close. In addition, the configuration of a rib has become in a circle and the moldability of a valve element can be improved by having a crevice in the center section. Moreover, it is desirable to establish a minute curved surface in the field of the side which forms the crevice of the end face section of a circular ring-like rib from this point.

[0204] Moreover, as shown in drawing 2 and drawing 3 , the ink tank unit 200 has attached the ID member 250 by joining and engagement, after inserting the valve system which contains 1st valve-yoke 260a and 2nd valve-yoke 260b in the feed hopper section of the ink stowage container 201. While PE liner 220 is exposed to the opening edge surface of the feed hopper of the ink stowage container 201, joining of the flange 268 of 1st valve-yoke 260a of a valve system

is carried out to this PE liner outcrop 221a and joining of the ID member 250 is carried out especially further in the part of a flange 268, it is engaged by engagement section 210a of the tank case 210.

[0205] With such a gestalt of attachment, when the 1st valve-yoke flange 508 to which the ID member 550 is joined, for example like the example of a comparison of drawing 11 is flat, an elastomer 567 will not exist inside the feed hopper hole established in the ID member 550, and there is a possibility that seal leakage may arise at the time of connection actuation of the joint pipe 180 shown in drawing 5 . So, with this operation gestalt, the joining side of the ID member 550 of the 1st valve-yoke flange 508 which was on the same field as the effective area of the joint opening 530 is retreated to the opposite side the tank wearing side. That is, as shown in drawing 2 , drawing 14 , etc., when the ID member 250 is pasted up on the 1st valve-yoke flange 268, the 1st valve-yoke flange 268 is arranged so that the outside surface of the ID member 250 may be equal to the effective area of the joint opening 230. Since an elastomer 267 certainly exists inside the feed hopper hole established in the ID member 250 according to this configuration, it becomes a valve system with high dependability without a possibility that the above seal leakage may arise. Moreover, by having shifted the 1st frame flange 268 from the effective area of the joint opening 230, since opening of the joint opening 230 protrudes from the flange face of the 1st frame flange 268, in case the ID member 250 is attached, the location of the ID member 250 is shown by opening of the joint opening 230, and positioning becomes easy.

[0206] Furthermore, it is equipped with each ink stowage container 201 of the ink tank unit 200 by this operation gestalt in an electrode holder 150, and it is performing liquid supply through the valve system of the joint pipe 180 and the joint opening 230 of a container 201 to each negative pressure control room container 110. Thus, in a serial scan type recording apparatus (refer to drawing 24), the electrode holder 150 equipped with the ink stowage container 201 is carried in carriage, and both-way migration is carried out in the direction parallel to the recording paper so that it may mention later. in this case, the connection place by axial blurring of the joint pipe 180 at the time of carriage round trip migration, location gap of the ink stowage container 201, etc. -- becoming complicated -- it is desirable from a viewpoint of product reliability to have taken that protection so that the seal condition of the medial surface of the joint opening 230 of the ink stowage container 201 and the lateral surface of the joint pipe 180 of the negative pressure control room container 110 may not get worse.

[0207] Therefore, axial Bure of the joint pipe connection place at the time of carriage round trip migration and **** be stop by bending of an elastomer, and the more reliable seal be make to secure with this operation gestalt by making thicker than thickness indispensable only merely carrying out the seal of between 1st valve yoke 260a and the joint pipes 180 thickness of the elastomer 267 inside 1st valve yoke 260a of a valve system showed in drawing 2 , drawing 14 , etc. Moreover, it is making rigidity of the valve yoke in which the joint pipe's 180 is inserted higher than the rigidity of the joint pipe 180 as other cures, and axial Bure of the joint pipe connection place at the time of carriage round trip migration and the deformation of a valve yoke depended for becoming complicated may be suppressed, and a more reliable seal may be secured.

[0208] Next, the dimension of each component which realizes the above-mentioned valve system is explained with reference to drawing 10 , drawing 17 , and drawing 25 .

[0209] In drawing 25 the die length e3 from 5.7mm and the valve element seal section 265 to valve element sliding shaft 261a 14.4mm, [the die length e5 of the longitudinal direction of a valve element 261] The die length e1 from 2nd valve-yoke 260b to the medial surface of an operculum 262 8.7mm, The die length e2 from 2nd valve-yoke 260b to the lateral surface of an operculum 262 11.0mm, The die length e4 of opening between 1st valve-yoke 260a and 2nd valve-yoke 260b 3.0mm, The amount e6 of protrusions of the rib section from the seal section 265 of a valve element 261 1.3mm, The die length b1 of the longitudinal direction of 0.8mm and the seal section 265 of a valve element 261 9.7mm, [the die length l2 of operculum joining guide 262a] The die length a1 of the longitudinal direction by the side of 1st valve-yoke 260a of 9.6mm and 2nd valve-yoke 260b 10.2mm, [the die length b2 of the longitudinal direction by the side of the operculum 262 of a valve element 261] The die length a2 of the longitudinal direction

by the side of the operculum 262 of 2nd valve-yoke 260b 10.4mm, The bore diameter c2 in which 1.8mm and valve element sliding shaft 261a of an operculum 262 are inserted for the shaft diameter c1 of valve element sliding shaft 261a 2.4mm, The die length of the spring as an energization member 263 11.8mm (spring constant : 1.016Ns/(mm)), The die length g1 of the 1st valve-yoke seal section 264 whose R section 262b of an operculum 262 is a part of R0.2mm (perimeter) and elastomer 267 0.8mm, The thickness u1 of R0.4mm and the 1st valve-yoke seal section 264 0.4mm, [the R section of the 1st valve-yoke seal section 264] The bore g2 of the longitudinal direction of 0.8mm and an elastomer 267 8.4mm, [the thickness u2 of an elastomer 267] The outer diameter g5 of the longitudinal direction of 10.1mm and the joint pipe 180 8.0mm, [the outer diameter g3 of the longitudinal direction of 1st valve-yoke 260a] For the amount l1 of retreat of 8.7mm and the 1st valve-yoke flange 268, the die length l3 of 1.0mm and the joint pipe 180 is [the outer diameter g4 of the longitudinal direction containing projection 180a for seals of the joint pipe 180 / the die length l4 of 9.4mm and projection 180b for valve-opening close] 2.5mm.

[0210] Although the die length g1 of the 1st valve-yoke seal section 264 is set to 0.8mm, the amount which is an amount which bends when the 1st valve-yoke seal section 264 is contacted with the seal section valve element seal section 165, and comes out of a valve yoke, and can carry out a seal completely is desirable. Therefore, the die length g1 of the 1st valve-yoke seal section 264 should just be within the limits of (g3-g2) / 2>g1> (b1-g2) / 2.

[0211] moreover, as a dimension of the rib 311 of projection 180for valve-opening close b of the joint pipe 180 which has the contact relation shown in drawing 10 and drawing 17 , and a valve element 261 The inside spacing f3 of projection 180b for valve-opening close which the thickness t of the joint pipe 180 and a rib 311 counters 0.75mm 1.7mm, For the outside spacing f1 of the direction of a short hand of the rib 311 of 3.2mm and the slot configuration of a valve element 261, the inside spacing f2 of 2.6mm and the direction of a short hand of a rib 311 is [the outside spacing f4 of projection 180b for valve-opening close / 1.4mm and die-length d of a rib 311] 3.6mm.

[0212] Moreover, as for the viewpoint of shaping precision to the thickness u2, it is [the elastomer 267 inside 1st frame 260a of a slot configuration] desirable in the periphery part and straight-line part of a slot configuration that it is the same. Moreover, the amount of interlocking for the seal between an elastomer 267 and the overall diameter section (part containing projection 180a for seals) of the joint pipe 180 is g4-g2=0.3mm, and made this amount absorb by the elastomer 267 in the vertical direction of the joint opening 230. Although there is 0.8mmx2= 1.6mm of real thickness for absorbing at this time, since the above-mentioned amount of interlocking is 0.3mm, to deformation of an elastomer 267, the force is so unnecessary. On the other hand, the amount of interlocking for a seal was set to 0.3mm, and the amount of interlocking was made to absorb also in the longitudinal direction of the joint opening 230 by the elastomer 267 whose real thickness is 0.8mmx2=1.6mm. Here, it is the bore g2 of the longitudinal direction of the outer-diameter g5< elastomer of a joint pipe about a lengthwise direction, and an elastomer can perform the positive seal of smooth insertion and a bond part by contacting only projection 180a for seals of a joint pipe in the condition which also shows a longitudinal direction in drawing 25 since it is g5<g2 similarly. Tolerance [gestalt / this / operation] of shakiness was set to **0.4mm at the maximum that shakiness of the longitudinal direction in the electrode holder 150 of the ink stowage container 201 should just be range (it is **0.8mm in the case of this operation gestalt) absorbed with the thickness of an elastomer. In the case of this operation gestalt, here the amount (the amount of gaps from a main location) of shakiness of a longitudinal direction When larger () than the one half of the absolute value of the difference of the outer diameter g5 of a joint pipe, and the bore g2 of the longitudinal direction of an elastomer namely, when shakiness of the longitudinal direction in this operation gestalt is **0.2mm or more In order that the outer wall of tubing other than projection 180a for seals of a joint pipe may reach far and wide in an elastomer and may contact and press to it, the force which is going to return to a main location according to the elastic force of an elastomer will work.

[0213] When taking the above dimensions, the valve system which does so the effectiveness mentioned above was realizable.

[0214] <Effectiveness by the arrangement location of a valve system> By the ink jet head cartlidge of this operation gestalt, the operculum 262 and 2nd valve-yoke 260b in the valve system attached in the joint opening 230 of the ink tank unit 200 are advancing deeply into PE liner 220 again. When PE liner 220 deforms with consumption of the ink in PE liner 220, even if the part of the joint opening 230 neighborhood in PE liner 220 exfoliates from a case 210 by this, deformation of the part of the joint opening 230 neighborhood in PE liner 220 is regulated by the part 262 deeply inserted into PE liner 220 of a valve system, i.e., an operculum, and 2nd valve-yoke 260b. Thus, even if PE liner 220 deforms with consumption of ink, the path for air bubbles for the cellular rise at the time of ink passage around the valve system in PE liner 220 and vapor-liquid exchange actuation being performed by the part near the valve system of PE liner 220 and deformation of the perimeter being regulated by the valve system is secured. Therefore, supply of the ink to the negative pressure control room unit 100 out of PE liner 220 at the time of deformation of PE liner 220 and a cellular rise within PE liner 220 are not barred.
[0215] In the ink jet head cartlidge equipped with the ink tank unit 200 which has deformable PE liner 220 as mentioned above, and the negative pressure control room unit 100, it is desirable to make the negative pressure in PE liner 220 and the negative pressure in the negative pressure control room container 110 balance so that vapor-liquid exchange actuation with the ink tank unit 200 and the negative pressure control room unit 100 may be performed after making PE liner 220 transform as greatly as possible, when increasing the buffer space in a case 210. Moreover, for high-speed supply of ink, it is good to enlarge joint opening 230 of the ink tank unit 200. Of course, it is desirable for space to be greatly vacant also as for the field of joint opening 230 near in PE liner 220, and to fully secure the ink supply way in the field.
[0216] If deformation of PE liner 220 is enlarged in order to secure the buffer space in the case 210 which contains PE liner 220 such, the space of joint opening 230 near in PE liner 220 will usually become narrow in connection with deformation of PE liner 220. When the space of joint opening 230 near in PE liner 220 becomes narrow, it may become impossible to correspond to high-speed ink supply by a rise of air bubbles being barred within PE liner 220, or the ink supply way of the joint opening 230 neighborhood being reduced. Therefore, a valve system does not advance deeply into PE liner 220 like the ink jet head cartlidge of this operation gestalt. In the case where deformation of PE liner 220 of the part around the joint opening 230 is not regulated Since it corresponds to high-speed ink supply, the deformation of PE liner 220 must be held down to the deformation to the range which does not have big effect on supply of ink, and the negative pressure in PE liner 220 and the negative pressure in the negative pressure control room container 110 must be made to balance.
[0217] On the other hand, with this operation gestalt, as mentioned above, a valve system advances even into the back in PE liner 220, and deformation of PE liner 220 of the part of the joint opening 230 neighborhood is regulated by the valve system. Since the field of joint opening 230 near in PE liner 220, i.e., the joint opening 230 and an ink supply way open for free passage, is fully securable by this even if it enlarges deformation of PE liner 220, it becomes possible to be compatible in reservation of the big buffer space within a case 210, and supply of the ink in a high flow rate.
[0218] Moreover, in order to detect the residue of the ink in PE liner 220 under the pars basilaris ossis occipitalis of the ink tank unit 200 in the ink jet head cartlidge mentioned above so that it may mention later, the electrode 270 used as an ink residue detection means is arranged. The electrode 270 is being fixed to the carriage of the printer by which it is equipped with an electrode holder 150. Here, since the joint opening 230 with which a valve system is attached is formed in the lower part of the front end side which becomes the negative pressure control room unit 100 side of the ink tank 200 and the valve system is deeply inserted into PE liner 220 in the direction almost parallel to the base of the ink tank unit 200, when PE liner 220 deforms, deformation of the pars basilaris ossis occipitalis of PE liner 220 is regulated by the part in which the valve system was inserted deeply. Furthermore, also when a part of pars basilaris ossis occipitalis of the ink stowage container 201 which consists of a case 210 and PE liner 220 inclines, deformation of the pars basilaris ossis occipitalis of PE liner 220 at the time of deformation of PE liner 220 is regulated. Since in addition to the effectiveness that deformation

of the pars basilaris ossis occipitalis of PE liner 220 is regulated by the inclination of the pars basilaris ossis occipitalis of such an ink stowage container 201 the migration to the electrode 270 of the pars basilaris ossis occipitalis of PE liner 220 is regulated when deformation of the pars basilaris ossis occipitalis of PE liner 220 is further regulated by the valve system, more exact ink residue detection is attained. Therefore, the liquid distribution system in which further more exact ink residue detection is possible after reconciling reservation of the big buffer space within the case 210 by enlarging deformation of PE liner 220 and supply of the ink in a high flow rate by deformation of PE liner 220 of the part of a near [the joint opening 230] being regulated by the valve system, as mentioned above is obtained.

[0219] although it is [in PE liner 220] deep, and is alike and the valve system is made to advance with this operation gestalt so that deformation of PE liner 220 of the part of a near [the joint opening 230] may be regulated as mentioned above, another different member from a valve system may be made to advance into PE liner 220, and deformation of the part of PE liner 220 may be regulated. Moreover, a plate member etc. may be made to advance into PE liner 220 from the joint opening 230, and the plate member may be made to extend along the base in PE liner 220 so that deformation of an about 270 electrode [in the pars basilaris ossis occipitalis of PE liner 220] part may be prevented. Thereby, in case the ink residue in PE liner 220 is detected using an electrode 270, more exact ink residue detection can be performed.

[0220] Furthermore, with this operation gestalt, the component part of the valve system is advancing even in the inner part of PE liner 220 further in the valve system attached in the joint opening 230 rather than opening 260c which is open for free passage with the joint opening 230, and becomes ink passage. Thereby, the ink tank unit 200 has the composition that the ink passage of joint opening 230 near in PE liner 220 can be secured certainly.

[0221] <Process of an ink tank> Next, based on drawing 18 , the manufacture approach of the ink tank of this gestalt is explained.

[0222] First, as shown in drawing 18 (a), PE liner outcrop 221a of the ink stowage container 201 is turned to the gravity direction upper part, and ink 401 is poured in into the ink stowage container 201 from ink supply opening by the ink impregnation nozzle 402. With the configuration of this invention, the ink impregnation under atmospheric pressure is possible.

[0223] Next, as shown in drawing 18 (b), after incorporating beforehand a valve element 261, an operculum 262, the energization member 263, 1st valve-yoke 260a, and 2nd valve-yoke 260b, this valve unit is dropped into the feed hopper section of the ink stowage container 201.

[0224] At this time, the periphery section of the sealing surface 102 of the ink stowage container 201 is surrounded by the stage configuration of the joining side outside of 1st valve-yoke 260a, the location of the ink stowage container 201 and 1st valve-yoke 260a is decided, and it becomes possible to send location precision. and — at the same time it hits the joining horn 400 to the periphery section of the joint opening 230 of 1st valve-yoke 260a from the upper part and joining of 1st valve-yoke 260a and PE liner 220 of the ink stowage container 201 is carried out by the sealing surface 102 — the periphery section of a sealing surface 102 — 1st valve-yoke 260a and the case 210 of the ink stowage container 201 — joining — a positive seal becomes possible. In addition, in this invention, it is applicable also in ultrasonic welding and oscillating joining. Moreover, it is applicable to heat joining, adhesives, etc.

[0225] Next, as shown in drawing 18 (c), 1st valve-yoke 260a puts the ID member 250 on the ink stowage container 201 by which joining was carried out. Where 1st valve-yoke 260a is put, click section 250a in the inferior-surface-of-tongue side of the ID member 250 is engaged in the case 210 located in the direction of an opposite of the sealing surface 102 of the ink stowage container 201, at the same time engagement section 210a and click section 250a of the ID member 250 which are formed in the case lateral portion of the ink stowage container 201 are engaged at this time (refer to drawing 3).

[0226] <Ink residue detection in a tank> Next, detection of the ink residue in an ink tank unit is explained.

[0227] As shown in drawing 2 , the tabular electrode 270 with width of face narrower than the width of face (the depth direction of a drawing) of the ink stowage container 201 is formed in the lower part of the field where it is equipped with the ink tank unit 200 of an electrode holder 150.

It is fixed to the carriage (un-illustrating) of the printer by which it is equipped with an electrode holder 150, and this electrode 270 is connected to the electric control system of a printer through wiring 271.

[0228] On the other hand, the ink jet head unit 160 is equipped with the ink supply pipe 165, the ink passage 162 open for free passage, two or more nozzles (un-illustrating) equipped with the energy generation component (un-illustrating) which generates the energy for ink regurgitation, respectively, and the common liquid room 164 that holds temporarily the ink supplied from the ink passage 162, and is supplied to each nozzle. An energy generation component is connected with the connection terminal 281 prepared in the electrode holder 150, and the connection terminal 281 is connected to the electric control system of a printer by equipping carriage with an electrode holder 150. The record signal from a printer is sent to an energy generation component through the connection terminal 281, it is giving regurgitation energy to the ink in a nozzle by the drive of an energy generation component, and ink is breathed out from the delivery which is the opening edge of a nozzle.

[0229] Moreover, in the common liquid room 164, the electrode 290 similarly connected with the electric control system of a printer through the contact pad 280 and the connection terminal 281 is formed. The ink residue detection means in the ink stowage container 201 consists of these two electrodes 270 and 290.

[0230] In addition, with this operation gestalt, in order to enable it to detect the ink residue by this ink residue detection means more correctly, it has prepared in the lower limit section in the busy condition of the field inserted into the maximum area side of the ink stowage container 201 which shows the joint opening 230 of the ink tank unit 200 to drawing 2 . Moreover, a part of base of the ink supply container 201 is made to incline to a horizontal plane in a busy condition. When the front end and the edge of it and the opposite side are specifically used as the back end for the near edge in which the joint opening 230 of the ink tank unit 200 was formed, it is made into a field parallel to a horizontal plane near [in which the valve system was prepared] the front end part, and the field from there to the back end is made into the inclined plane which goes up toward the back end from the front end. If deformation of PE liner 220 mentioned later is taken into consideration, as for whenever [tilt-angle / of the base of this ink stowage container 201], it is desirable that the angle with the back end side of the ink tank unit 200 to make is an obtuse angle, and it is set up so that it may become 95 degrees or more with this operation gestalt.

[0231] And according to the configuration of the base of such an ink stowage container 201, the electrode 270 is arranged so that it may become these inclination field and parallel in the inclination field of the base of the ink stowage container 201, and the location which counters.

[0232] Below, residue detection of the ink in the ink stowage container 201 by this ink residue detection means is explained.

[0233] Ink residue detection impresses a pulse voltage between the electrode 270 by the side of an electrode holder 150, and the electrode 290 in the common liquid room 164, and is performed by detecting the capacitance (electrostatic capacity) which changes according to the opposed face product of the electrode 270 at that time, and ink. For example, the existence of the ink in the ink stowage container 201 is detectable because peak value impresses the square wave pulse voltage which is 5V with the pulse frequency of 1kHz and carries out data processing of the time constant and gain of the circuit between two electrodes 270 and 290.

[0234] If the ink residue in the ink stowage container 201 decreases by consumption of ink, a liquid ink side will descend toward the base of the ink stowage container 201. Furthermore, if an ink residue decreases and a liquid ink side arrives at the inclination field of the base of the ink stowage container 201, with consumption of ink, the opposed face product of an electrode 270 and ink will become small gradually (the distance of an electrode 270 and ink is almost fixed), and capacitance will begin to decrease.

[0235] It can detect by ink stopping existing in an electrode 270 and the part which counters finally, and changing the pulse width of an impression pulse for the fall of gain, and the rise of the electric resistance in ink, or changing a pulse frequency, and calculating a time constant, it has this, and judges that there is very little ink in the ink stowage container 201.

[0236] Although the above is the outline of detection of an ink residue In fact the ink stowage container 201 of this operation gestalt It consists of PE liner 220 and a case 220. With consumption of ink So that the balance of the negative pressure in the negative pressure control room container 110 and the negative pressure in the ink stowage container 201 may be maintained PE liner 220 deforms in the content volume reduction direction inside, introducing vapor-liquid exchange between both, and air of a between [the case 210 through the open air free passage opening 222, and PE liners 220].
[0237] In the case of this deformation, as shown in drawing 6 , PE liner 220 deforms, receiving regulation in the corner section of the ink stowage container 201. The exfoliation or balking from the deformation 210 of PE liner 220, i.e., a case, is the largest in respect of two used as the maximum area side (field almost parallel to the cross section shown in drawing 6), and small on the base which are the field and an adjoining field. In connection with deformation of PE liner 220, the distance of ink and an electrode 270 becomes large and capacitance still becomes small in inverse proportion to the distance. However, with this operation gestalt, the main field of an electrode 270 is located in the field which intersects perpendicularly with the deformation direction of PE liner 220 mostly, and even if PE liner 220 deforms, it is kept almost parallel by an electrode 270 and the field near the pars basilaris ossis occipitalis of PE liner 220. Consequently, the area which forms electrostatic capacity is secured and positive detection is attained.
[0238] Moreover, since the include angle of the corner section of the base of the ink stowage container 201 and a back end side to make constitutes the obtuse angle of 95 degrees or more from this operation gestalt as mentioned above, compared with other corner sections, PE liner 220 tends to secede from a case 210. Consequently, also when PE liner 220 deforms toward the joint opening 230, it is easy to discharge ink toward the joint opening 230, and is constituted.
[0239] As mentioned above, although the configuration of this operation gestalt was explained according to the individual, even if it combines these suitably, they are possible, and the further effectiveness is also possible for them by combining.
[0240] For example, by combining an ellipse configuration and the above-mentioned valve configuration for the joint section, sliding at the time of attachment and detachment is stabilized, and more positive closing motion is attained also about closing motion of a valve. Moreover, the amount of supply of ink can be certainly raised by considering as an ellipse configuration. Under the present circumstances, although the supporting point of rotation wearing shifts to the upper part, little stable attachment-and-detachment actuation which becomes complicated is attained by making the base of an ink tank incline in the upper part.
[0241] <Ink jet head cartlidge> drawing 23 is the approximate account Fig. of an ink jet head cartlidge using an ink tank unit applicable to this invention.
[0242] The ink jet head cartlidge 70 of the gestalt shown in drawing 23 two or more kinds of liquids (the case of this operation gestalt — yellow (Y) and a Magenta (M) —) Negative pressure control room container 110a which contained each liquid to the ink jet head unit 160 in which the regurgitation [three colors of cyanogen (C)] is possible, It has the negative pressure control room unit 100 with which 110b and 110c were united, and the ink tank units 200a, 200b, and 200c which contained each liquid to this negative pressure control room unit 100 are mutually made removable.
[0243] In order to mistake each ink tank unit 200a, 200b, and 200c in the corresponding negative pressure control room containers 110a, 110b, and 110c and to make it equip with it with this operation gestalt that there is nothing While forming the electrode holder 150 of a wrap, a part of external surface of the in tank unit 200 It has the composition of preventing incorrect wearing certainly, by forming the ID member 250 which has a crevice in the front face of the wearing direction of the ink tank unit 200, and forming the convex ID member 170 corresponding to the negative pressure control room container 110 with the crevice of the ID member 250.
[0244] In this invention, it cannot be overemphasized that it is arbitrary about the number of the liquid containers contained and combination (for example, only black (Bk) is an independent tank and other Y, M, and C really use it as a tank) to say nothing of [the class of liquid contained] being other colors other than Y, M, and C.
[0245] A <recording apparatus> next an above-mentioned ink tank unit, or an example of an ink

jet recording apparatus that can carry an ink jet head cartlidge is explained using drawing 24 .
[0246] The recording apparatus shown in drawing 24 is equipped with the head recovery unit 82 into which the suction pump for attracting ink was built, and the feed side 83 where the record form as recorded media is conveyed from two or more orifices at the time of the head cap for preventing the ink desiccation from the carriage 81 which can be carried free [attachment and detachment], and two or more orifices of a head for the ink tank unit 200 and the ink jet head cartlidge 70, and the malfunction of a head.
[0247] Carriage 81 makes the location on the recovery unit 82 the home position, and is scanned leftward in drawing because a belt 84 drives by a motor etc. Printing is performed by carrying out the regurgitation of the ink from a head during this scan towards the record form conveyed on the feed side (platen) 83.
[0248] As explained above, the above-mentioned configuration of this operation gestalt is a configuration which is not in the former, and while each brings about an effective thing independently, an organic configuration is brought about because there is each requirement for a configuration also complexly. That is, each configuration in **** is invention which was excellent even if it saw complexly, even when it was independent, and is indicating the desirable example of a configuration for this invention. In addition, although the valve system of this invention is most suitably available in an above-mentioned liquid stowage container, it can be applied to other containers which hold a liquid directly in the feed hopper section, without being limited to this gestalt as a configuration of a liquid stowage container.
[0249] <Supplementary information about liquid detection> Next, supplementary information about existence detection (or residue detection) of a liquid which is the greatest description of this invention is performed.
[0250] First, with reference to drawing 26 which is a sectional view in alignment with the longitudinal direction of a nozzle, supplementary information is carried out about the cross-section configuration of the ink jet head unit 160 used for the ink jet head cartlidge of this invention shown in drawing 2 etc. In drawing 26 , the laminating of the accumulation layer 192 which consists of SiO2 is carried out, and the exoergic resistive layer 193 which consists of TaN on it is formed in the silicon substrate 191 supported by the support substrate 190 which consists of aluminum. On the exoergic resistive layer 193, wiring 194a for exoergic resistance is formed, and the field across which it faced by this wiring 194a serves as the heat operation section. On the other hand, wiring 194b for electrode 290 later mentioned to the common liquid room 164 side is formed. In addition, the contact pad 197 for electrical installation with the exterior is formed in the nozzle 163 and the edge of the opposite side. And on wiring 194a, the laminating of the cavitation-proof layer 196 which consists of a protective layer 195 which consists of SiN, and Ta is carried out. On the other hand, similarly on wiring 194b, the protective layer 195 and the electrode 290 are formed. An electrode 290 consists of Ta (with this configuration, it is the film of the cavitation-proof layer 196 and one), and forms the protective layer 195 linked to wiring 194b in some fields (refer to drawing 26). Thus, the top plate 198 with which the ink feed hopper 199 for supplying ink to the passage wall which divides a nozzle 163 on the constituted base for heads, and the common liquid room 164 was formed is joined, and the ink jet head unit 160 is constituted by this.
[0251] The electrode 290 mentioned above is formed so that it may expose in the liquid room space of the common liquid room 164, and it always touches ink in an anticipated-use condition. Moreover, an electrode 290 is connected with the electric control system of a printer through the contact pad 280 corresponding to wiring 194b through the connection terminal 281 further prepared in the ink jet head unit 160.
[0252] The ink residue detection means in the ink stowage container 201 consists of these two electrodes 270,290. The equal circuit between these two electrodes 270,290 is shown in drawing 27 . As shown in drawing 27 , this equal circuit is a RC series circuit of the resistance which ink itself has, and the capacitance of the ink which exists between electrodes 270,290.
[0253] Now, supplementary information is performed using drawing 28 about residue detection of the ink in the ink stowage container 201 by this circuit. In this example, as mentioned above, a pulse voltage is impressed between the electrode 270 by the side of an electrode holder 150,

and the electrode 290 in the common liquid room 164, and it is carrying out by detecting the capacitance (electrostatic capacity) which changes according to the opposed face product of the electrode 270 at that time, and ink.

[0254] Although it changes with physical properties of ink etc. when the pulse shown in drawing 28 (a) is specifically impressed between electrodes 270,290, and ink fully exists in the ink stowage container 201, an output wave as shown in drawing 28 (b) is observed. If the ink in the ink stowage container 201 is lost, an output wave as shown in drawing 28 (c) and drawing 28 (d), respectively will be observed with reduction of the capacitance by ink having been lost, and the increment in resistance.

[0255] In addition, although the electrode 290 is formed in the common liquid room 164 with this operation gestalt, as long as an electrode 290 is a location which always contacts ink in the state of anticipated use, it may be prepared in other parts 140, for example, the absorber in the negative pressure control room container 110.

[0256] If the ink residue in the ink stowage container 201 decreases by consumption of ink, a liquid ink side will descend toward the base of the ink stowage container 201. Furthermore, if an ink residue decreases and a liquid ink side arrives at the inclination field of the base of the ink stowage container 201, with consumption of ink, the opposed face product of an electrode 270 and ink will become small gradually (the distance of an electrode 270 and ink is almost fixed), and capacitance will begin to decrease. In addition, as long as it notes this point, necessarily it is not necessary to arrange an electrode 270 so that it may become the base and parallel toward which the ink stowage container 201 inclined like this operation gestalt, and it may be arranged on a horizontal direction and parallel.

[0257] And if the area of an electrode 270 and the ink which counters will become still smaller if ink is consumed further, and the opposed face product of an electrode 270 and ink becomes very small, capacitance will serve as zero mostly, and it is detected that it is in the condition whose ink was almost lost (drawing 28 (c)).

[0258] When the ink in the ink stowage container 201 decreases very much, ink stops existing in an electrode 270 and the part which counters, and it can detect by changing the pulse width of an impression pulse for the fall of gain, and the rise of the electric resistance in ink, or changing a pulse frequency, and calculating a time constant (drawing 28 (d)), it has this, and judges with having exhausted the ink in the ink stowage container 201.

[0259] That is, since the output (height of the whole wave) obtained when a square wave pulse is impressed is proportional to capacitance in general and changes with hb->hc with reduction in capacitance, it is setting beforehand the threshold corresponding to the ink level (with [in the case of this example] no "ink") of the request to during this period as equipment, and can detect ink level by the comparison operation with a detection value. Moreover, with increase of resistance, since it is expressed in general with the product of Resistance R and capacitance C, even if the time constant of an output wave is the same impression pulse, it changes like tc->td. In addition, it is also possible to detect the amount of ink in analog by setting beforehand the information on the change accompanying two or more thresholds or ink consumption as equipment.

[0260] At this time, in the negative pressure control room container 110, where an ink interface is formed in the upper part of the downward absorber 140, ink still remains. Therefore, if the ink tank unit 200 is exchanged at this time, ink can be supplied to the negative pressure control room container 110 from the ink tank unit 200 in the condition of having been stabilized continuously.

[0261] In addition, detecting a liquid residue (existence) to the ink tank unit 200 of the liquid distribution system shown in drawing 2 , and exchanging the ink tank unit 200 according to this detection differ in that the ink tank unit 200 is exchanged, having the negative pressure control room unit 100 which holds ink to an ink jet head cartlidge side compared with the ink jet head cartlidge which makes the conventional ink tank exchangeable. In an above-mentioned liquid distribution system, since the ink in the negative pressure control room unit 100 and the ink in the exchanged new ink tank unit can contact easily and can form an ink supply path in the case of exchange of the ink tank unit 200, it is not necessary to carry out recovery operation for

fulfilling an ink supply path in ink to an ink jet head cartlidge in the case of ink tongue unit 200 exchange. Consequently, the excessive ink consumption accompanying recovery can also be reduced. In order to acquire such an advantage certainly, it is very important to detect existence of the ink in the ink tank unit 200 certainly and cheaply, and it is extremely excellent also from a viewpoint of prevention of consumption of the excessive liquid in an above-mentioned liquid distribution system to perform such positive ink existence detection by applying this invention.
[0262] <Various modifications> Next, the various modifications of this invention are explained to a detail using a drawing. In addition, as long as there is no especially notice about each following modification, combination is possible in each modification (this operation gestalt shown in drawing 2 is also included), and it shall be contained in this invention also about the various gestalten produced with combination.
[0263] (The 1st modification) Drawing 29 is the sectional view of the ink jet cartridge of the 1st modification of this invention.
[0264] The ink stowage container 401 of the ink tank unit 400 consists of these modifications so that a base may become the horizontal plane and parallel in a busy condition. Moreover, it is constituted so that the part which receives the base of the ink stowage container 401 of the electrode holder 350 of the negative pressure control room unit 300 may also become the horizontal plane and parallel in a busy condition in connection with it. Moreover, the electrode 470 by the side of an electrode holder 350 is also being fixed to the printer so that it may consist of members of a monotonous configuration and may become the base of the ink stowage container 401 with which the electrode holder 350 was equipped, and parallel. Since it is the same as that of the example shown in drawing 2 about other configurations, the explanation is omitted.
[0265] Also in this modification, PE liner 420 of the ink stowage container 401 deforms inside so that the negative pressure in the negative pressure control room container 310 of the negative pressure control room unit 300 may be balanced. Here, about the base of the ink stowage container 401, although it is not the structure which inclined like the example shown in drawing 2 , since the electrode 470 is formed in the deformation direction and perpendicular of PE liner 420, there is the same effectiveness as the example too shown in drawing 2 .
[0266] Moreover, since the angle of the base of the ink stowage container 401 and a back end side to make is not constituted by the obtuse angle, in the case of deformation of PE liner 420, the deformation in this corner section receives regulation a little with a case 410. Therefore, as the base of PE liner 420 deforms so that a center section may rise, and shown in drawing 29 (a), ink 460 may remain in two places, the front end section and the back end section. However, with migration of the carriage (un-illustrating) which carries this ink jet cartridge, as shown in drawing 29 (b), it is united with the ink by the side of the joint opening 430 which is a connection with the negative pressure control room container 310, and derivation becomes possible from the joint opening 430 to the negative pressure control room container 310. If the ink 460 in the ink stowage container 401 is consumed as the example shown in drawing 2 described in the meantime, when the ink 460 which counters an electrode 470 is almost lost and capacitance serves as zero mostly, it will be detected that ink using up is near.
[0267] If ink stops existing in an electrode 470 and the part which counters finally and the ink in the ink stowage container 401 is lost, that the electric resistance in ink rises to more than number 100kohm can detect by changing the pulse width of an impression pulse, or changing a pulse frequency, and calculating a time constant, it will have this, and it will judge with having exhausted the ink in the ink stowage container 401.
[0268] (The 2nd modification) Drawing 30 is the sectional view of the ink jet cartridge of the 2nd modification of this invention. This modification differs from the example which the configuration of the ink stowage container 601 of the ink tank unit 600 shows to drawing 2 . That is, the ink stowage container 601 of this modification consists of only cases 610 which cannot deform storage space of ink easily not due to the thing of double structure but due to derivation of ink. The ink stowage container 601 forms a closed space except for the joint opening 630, and the air or the nitrogen gas which serves as a source of fine pressurization with ink is contained inside. Since other configurations are the same as that of the example shown in drawing 2 , the

explanation is omitted.
[0269] Thus, even if it is the ink tank unit 600 of a configuration of that the ink stowage of the ink stowage container 601 does not deform, exhausting the ink in the ink stowage container 601 is detectable like the example shown in drawing 2 .
[0270] The ink tank unit which has the ink stowage container of the double structure of a PE liner and a case which were stated in this modification in the example shown in drawing 2 , (The 3rd modification) Including the condition that exchange both with the ink tank unit which has the ink stowage container which consisted of only cases which were stated in the 2nd modification, and an electrode detects the example of the control in an usable system, it divides into some phases and explains with reference to drawing 31 - drawing 38 . In addition, since the ink jet cartridges explained in this modification are what was shown in drawing 2 , and the thing of the same configuration, in drawing 31 - drawing 38 , the same sign as drawing 2 is attached about the same part as drawing 2 .
[0271] (1) Since the ink drawn from the joint opening 230 by vapor-liquid exchange stops existing as shown in ink tank using-up drawing 31 when the ink in the ink tank unit 200 is exhausted, atmospheric air is drawn into PE liner 220 of the ink stowage container 201 through an absorber 130,140 from the atmospheric-air free passage opening 115. Thereby, PE liner 220 carries out expansion restoration in the direction which faces to a case 210, as shown in an arrow head, and it is stabilized in contact with a case 210.
[0272] In the meantime, the ink interface in the downward absorber 140 descends toward a location B from the location A when ink exists in the ink stowage container 201 and vapor-liquid exchange actuation is performed with ink supply to the ink jet head unit 160. And before an ink interface arrives at a location B, this ink tank unit 200 is exchanged for a new thing. In addition, the actuation after exchange is explained in the phase of (3) mentioned later.
[0273] (2) Ink tank wearing drawing 32 shows the condition immediately after equipping with the new ink tank unit 200.
[0274] If equipped with the ink tank 200, a pulse voltage will be impressed between the electrode 270 of the lower part of an electrode holder 150, and the electrode 290 (refer to drawing 2) prepared in the ink jet head unit 160, and it will be detected from the time constant (or gain) whether it was equipped with the ink tank unit 200 in which ink was held. When it is not equipped with an ink tank unit or is equipped with a used ink tank unit, warning is emitted and tank wearing is demanded from a user.
[0275] Thus, wearing of the ink tank unit 200 connects the ink in the ink stowage container 201 directly indirectly [the downward absorber 140 / the upper absorber 130] through the joint opening 230 and the joint pipe 180, as shown in drawing 33 . And in order to maintain the balance of the negative pressure in the ink stowage container 201, and the negative pressure in the negative pressure control room container 101, the ink in the ink stowage container 201 flows into the negative pressure control room container 110 through the joint opening 230 and the joint pipe 180. Consequently, it goes up from the location B mentioned above, ink is absorbed by even the upper absorber 130, and the ink interface in the negative pressure control room 110 is attained to a location C.
[0276] In the ink stowage container 201, PE liner 220 which has contained ink directly deforms inside with the migration of ink in the negative pressure control room container 110 from the ink stowage container 201. The exfoliation (balking) from a case 210 is seldom seen in the cross section which deformation of PE liner 220 has the main deformation in respect of the maximum area, and is shown in drawing 33 at this time.
[0277] (3) If ink is supplied to the ink consumption phase 1 ink-jet head unit 160, the ink in the negative pressure control room container 110 is consumed, and as shown in drawing 34 , the interface of the ink in the negative pressure control room container 110 descends toward the location A which is a location within the downward absorber 140 from the location C which is a location within the upper absorber 130. In the meantime, the ink in the ink stowage container 201 is also consumed by coincidence, PE liner 220 deforms inside further with the consumption, and PE liner 220 begins to secede from a case 210 also in fields other than the maximum area side. If an ink interface descends to a location A, as shown in drawing 35 , vapor-liquid exchange

actuation will start to maintain uniformly the negative pressure in the ink stowage container 201.
[0278] Balking (balking [in / specifically / a base]) from the case 210 of above-mentioned PE liner 220 can be detected using the ink residue detection means which consists of two electrodes 270,290 (refer to drawing 2). In the case of the ink stowage container 201 with deformable PE liner 220, in connection with deformation of PE liner 220, the distance of ink and an electrode 270 becomes large, and it is stabilized in a fixed distance by balancing negative pressure after that. And it is detectable that it is in a vapor-liquid exchange condition by detecting change of the capacitance by change of this distance, and the condition that after that was stabilized mostly.
[0279] Since there is no change of the distance of such an electrode 270 and ink and change of the capacitance by this is not accepted, either, when the ink tank unit 600 which has the ink stowage container 601 which, on the other hand, does not have a PE liner as shown in drawing 30 is connected to the negative pressure control room container 110, it turns out that the ink tank unit of a gestalt which is different in the ink tank unit 201 was connected by this.
[0280] In the ink distribution system designed considering using the ink tank unit 200 with deformable PE liner 220 as a premise When it equips with an ink tank unit without a PE liner, such an ink tank unit Since there is no buffer effectiveness which absorbs expansion of the air in the ink stowage by environmental variation which was stated to the ink tank unit itself in the example shown in drawing 2 , ink may overflow in the negative pressure control room container 110, and proper negative pressure may be unable to be generated.
[0281] In order to avoid such fault, when the ink tank unit to which capacitance does not fall even if it consumes the ink of the specified quantity is recognized noting that it was a tank unit of structure without a PE liner and there is a temperature change, ink can be compulsorily attracted from the nozzle 163 (refer to drawing 2) of the ink jet head unit 160, and dependability can be secured by discharging excessive ink.
[0282] In addition, the indirect environmental temperature detection means at the time of usually printer intact [by means to detect environmental temperature, or the temperature detection means of a recording head] is formed in the printer, and the above-mentioned temperature change can be known using this.
[0283] (4) As shown in drawing 36 , the ink in the ink stowage container 201 will be consumed, and if ink is consumed continuing ink consumption phase 2 vapor-liquid exchange, where the ink interface in the negative pressure generating room container 110 is stabilized mostly in a location A, as shown in drawing 37 , the base of PE liner 220 of the ink stowage container 201 will appear gradually. Thereby, the boundary line at the liquid ink side within PE liner 220 and the base of a PE liner moves toward the joint opening 230, and the opposed face product with the electrode 270 of the ink in the ink stowage container 201 decreases. Since capacitance decreases continuously in the meantime, the ink residue in the ink stowage container 201 in the stage whose ink residue in the ink stowage container 201 decreased is detectable in analog using this.
[0284] (5) When ink is consumed to the ink consumption phase 3 pan, as it is shown in drawing 38 , if the ink in the ink stowage container 201 comes to exist only in an about 230 joint opening level part and this ink is lost further, capacitance will approach zero mostly and resistance (electric resistance) will increase extremely. Judging it as exhausting the ink of the ink tank unit 200 with this, a printer notifies of the promotion of tank exchange to a user.
[0285] (6) If the ink in the ink tank unit exchangeable term ink tank unit 200 becomes empty, as explained in the phase of (1), restore PE liner 220 to the condition of a basis so that a case 210 may be contacted. Moreover, even if ink becomes empty, ink exists in the joint pipe 180 which is in the downstream of the ink tank unit 200 to the supply direction of ink, the downward absorber 140, and the ink jet head unit 160, and continuation of printing is possible. If a user exchanges for the new ink tank 200 at this time, it will be as having explained in the phase of (2) after it. Moreover, when it equips with the ink tank unit once removed in the condition that ink still remains while in use again, it is as having explained in the phase of (3) or (4).
[0286] Moreover, as mentioned above, even if the ink in the ink tank unit 200 is lost, a certain extent can continue printing. However, if it falls from the location (B) in which it cannot form the

ink pass with which it continued from the joint opening 180 to the ink jet head unit 160 even if the ink interface in the negative pressure control room container 110 connects a new ink tank unit, formation of good ink pass will become difficult.

[0287] In order to prevent this, when the phase of (5) mentioned above is completed, by the count of the count of the regurgitation of the ink from a nozzle (refer to drawing 2) Control of not resuming printing actuation is possible until it is equipped with the ink tank unit which converted the consumption of ink, interrupted printing actuation just before the ink interface in the negative pressure control room container 110 arrived at a location B, demanded tank exchange from the user again, and held ink.

[0288] (The 4th modification) Drawing 39 is a sectional view explaining the 4th modification of this invention. The ink stowage container of this modification is held at holders, such as an ink jet head cartlidge, in the form as shown in drawing 1 like the above-mentioned operation gestalt. Drawing 39 is the sectional view which cut two or more ink stowage containers 201.

[0289] As shown in the sectional view of drawing 39 , only spacing p ends mutually and, specifically, ink stowage container 201Y which contains ink stowage container 201M which contain ink stowage container 201Bk which contains black ink, ink stowage container 201C which contains cyanogen ink, and Magenta ink, and yellow ink is held at juxtaposition.

[0290] Considering only one ink stowage container 201, as mentioned above, RC series circuit is constituted between electrodes 270,290, but in this way, when two or more ink stowage container 201Bk(s), and 201C, 201M and 201Y adjoin, electrostatic capacity C12, C23, and C34 occurs between adjoining ink stowage containers like the equal circuit shown in drawing 41 (a) besides the electrostatic capacity C1-C4 for every ink stowage container. And the electrostatic capacity C12, C23, and C34 between the ink stowage containers which these-adjoin becomes the factor to which it changes with the amounts of ink in an adjoining ink stowage container and which changes the time constant of an ink residue detection system. So, it is necessary to make magnitude of such electrostatic capacity C12, C23, and C34 as small as possible, and to make these effects small for more exact ink residue detection.

[0291] When distance between the internal surfaces of S and an ink stowage container (spacing p of the thickness x2+ ink stowage container of the side attachment wall of an ink stowage container) is set to d and a dielectric constant is set to epsilon for the lateral area of an ink stowage container in the relation of adjoining ink stowage containers here, the electrostatic capacity Cab between ink stowage containers is Cab=epsilon (S/d). — It is a formula (1). It is come out and expressed (distribution which crossed d to the detail throughout the lateral area, and bent is carried out, and expressed with the integral equation of the dielectric constant of the resin which forms a hold container, and the air of spacing P.). From a formula (1), in order to make small electrostatic capacity Cab between ink stowage containers, how to make a lateral area S small and the approach of enlarging distance d between container walls can be considered. It is not desirable from a viewpoint of the receipt effectiveness of ink to make a lateral area S small. So, in this modification, it corresponds by enlarging distance d between container walls.

[0292] More, in a detail, in order to make spacing d between ink stowage container 201Bk, 201C and 201M, and 201Y as small as possible in consideration of miniaturizing carriage since a print system is miniaturized it is shown in drawing 39 — as — each — ink stowage container 201Bk, and 201C and 201M — When thickness of the bottom wall which counters the thickness of a side attachment wall with T1, t1, and an electrode 270 is set to T2 and t2 (T of a capital letter expresses the thickness of a case and t of a small letter expresses the thickness of a PE liner, respectively) about 201Y, T1> Ink stowage container 201Bk, and 201C, 201M and 201Y are fabricated so that the relation of T2 and t1>t2 may be filled. Thereby, compared with the case where all wall thickness is fabricated to homogeneity, electrostatic capacity Cab between ink stowage containers can be made small, consequently effect by the mutual intervention can be lessened, and an ink residue can be detected more now to high degree of accuracy.

[0293] Moreover, as shown in drawing 41 (b), a mutual buffer can be reduced more by dropping electrically detectors other than an ink stowage container detecting on GROUND.

[0294] By the way, with this operation gestalt, as drawing 2 also explained, the ink stowage

container 201 is the dual structure of a case 210 and PE liner 220, and PE liner 220 deforms it inside with derivation of ink. And this deformation is the largest in respect of the maximum area which is an opposed face with the adjoining ink stowage container 201, as mentioned above. Therefore, although the ink stowage container 201 which has PE liner 220 like this operation gestalt is more desirable since the distance d between container walls becomes large with derivation of ink, this invention is not restricted to the ink stowage container 201 of such dual structure, and may not have the PE liner which deforms with derivation of ink. The example in this case is shown in drawing 40 . Also in drawing 40 , the thickness T1 of the case of a side attachment wall and the thickness T2 of a case at the bottom are filling T1>T2.

[0295] Moreover, although the upper wall and the bottom wall showed the thing of the configuration which becomes parallel [a bottom wall] to a horizontal plane about the cross direction of the ink stowage container 201 in parallel, i.e., a busy condition, mutually as the ink stowage container 201 was shown also in drawing 39 , it is made to incline to a horizontal plane also crosswise, and you may make it the opposed face product of ink when an ink residue decreases, and an electrode become smaller in the modification mentioned above.

[0296] The example of such an ink stowage container is shown in drawing 42 . Ink stowage container 501a shown in drawing 42 (a) has the bottom wall which the crosswise abbreviation center section projected to the inner direction. The bottom wall of ink stowage container 501a and electrode 570a which counters are also the configuration doubled with the configuration of the bottom wall of ink stowage container 501a. By this, when the ink residue in ink stowage container 501a decreases, ink will remain only in the crosswise both ends of ink stowage container 501a. On the other hand, in the condition that ink fully remains, the opposed face product of ink and electrode 570a is large compared with the case where a bottom wall is flat. Therefore, since the ratio of the opposed face product of the time of ink fully remaining and the time with few residues becomes large and the S/N ratio of an output wave in electrode 570a also becomes large, it can detect more correctly that ink was lost.

[0297] As for ink stowage container 501b shown in drawing 42 (b), similarly a bottom wall inclines uniformly, and ink 502b is the configuration where electrode 570b was also doubled with the configuration of the bottom wall of ink stowage container 501b while having composition which remains in the crosswise end section. Moreover, while ink stowage container 501c shown in drawing 42 (c) has a boiled-fish-paste-like bottom wall and ink 502c has composition which remains in a crosswise center section, it is the configuration where electrode 570c was also doubled with the configuration of the bottom wall of ink stowage container 501c. In addition, although the wall surface is drawn as a thing of a monolayer, the ink stowage containers 501a, 501b, and 501c may be the things of dual structure as shown in drawing 2 etc., and may be constituted from drawing 42 (a) - (c) by only the case as illustration.

[0298] (The 5th modification) Drawing 43 and drawing 44 are the explanatory views for explaining the 5th modification of this invention. In this modification, it differs to the above-mentioned operation gestalt shown in drawing 2 in that the tank endite 202 which projects to the inside over the crosswise (the depth direction of drawing 43) whole region of the ink stowage container 201 is formed in the base of the ink stowage container 201.

[0299] This tank endite 202 is located in a front 230, i.e., joint opening, side rather than the electrode 270 and the location which counters, as shown in drawing 43 . In connection with the tank endite 202 being formed in the ink stowage container 201, the skin of the part corresponding to the tank endite 202 of the ink stowage container 201 serves as a crevice, and when a holder 150 is equipped with the ink tank unit 200, the holder projection 152 which fits into a crevice is formed in this crevice of a holder 150, and the part which counters.

[0300] The tank endite 202 is explained to a detail with reference to drawing 44 . The tank endite 202 has two inclined planes of inclined plane (1st field) 202a which counters the joint opening 230, and inclined plane (2nd field) 202b which counters the back end side of the ink tank unit 200. When the angle over the horizontal plane in a busy condition on which theta 1 and the 2nd field make the angle which the 1st field makes is set to theta 2 here, the relation of theta1>theta2 is filled. concrete -- this operation gestalt -- theta -- 1 = about 60 degrees and theta -- it may be 2 = about 30 degrees. Moreover, the vertical angle of the holder projection

151 which fits into the tank endite 202 was made into about 90 degrees with this operation gestalt.

[0301] If the ink in an ink tank with such a projection is consumed and the location of an oil level falls rather than the location of top-most-vertices 202c (refer to drawing 44) of the tank endite 202, ink will be divided forward and backward bordering on the ink endite 202. Since the angles theta1 and theta2 with the horizontal plane of the 1st field 201a of the tank endite 201 and 2nd field 201b to make are formed here so that the relation of theta1>theta2 may be filled The ink by the side of the back end of the ink stowage container 201 becomes that it is easy to be discharged to the joint opening 230 side by rocking of the ink in the record ink stowage container 201 by the reciprocating motion of working carriage of the printer which carries this ink tank unit 200 exceeding the tank endite 202. On the other hand, the ink by the side of the joint opening 230 has pile composition to the back end side at return exceeding the tank endite 202.

[0302] Like the above-mentioned operation gestalt, in the case of an ink stowage container without fragmentation structure like this modification, the ink in the ink stowage container 201 is consumed, and ink may remain in the shape of film with the surface tension of ink in the condition that the ink in the ink stowage container 201 is lost at the pars basilaris ossis occipitalis of the ink stowage container 201. In this modification, since it has the tank endite 202 in the bottom wall of the ink stowage container 201, even if ink remains in the electrode 270 of the pars basilaris ossis occipitalis of the ink stowage container 201, and the field which counters in the shape of film, the continuity of ink will be divided by the tank endite 202. Consequently, the impedance of the electrical circuit between the ink through the liquid stowage 201 and an electrode 270 rises. By detecting the time constant at this time, and change of gain, it can judge that there are very few residues of the ink in the ink stowage container 201.

[0303] Moreover, since a holder 150 has the holder projection 151 which fits into the tank endite 202, it can ensure maintenance of the alignment of the ink tank unit 200 at the time of equipping a holder 150 with the ink tank unit 200, and the ink tank unit 200 to a holder 150. And since wearing of the ink tank unit 200 to a holder 150 is performed by abbreviation rotation actuation which was mentioned above, it can equip with the ink tank unit 200 smoothly by setting to theta2>theta1 relation of theta1 and theta2 which were shown in drawing 44 .

[0304] In addition, although the ink stowage container 201 of the dual structure of a case 210 and PE liner 220 was mentioned as the example and explained, the ink stowage container in this invention may be constituted from the modification mentioned above by only not only this but the case 210. Moreover, as long as it is the structure which can divide ink as mentioned above although this modification mentioned the tank endite 202 as the example as structure of making an electrode 290 and the ink of the field which counters dividing so that it may not continue the joint opening 230 side when the ink residue in an ink stowage container turns into a residue which should be detected, you may constitute as a stair-like level difference which only made low the height by the side of the joint opening 230. However, about the part which is high as a level difference, since the receipt effectiveness of ink will fall only in the part, such structure has a more desirable projection configuration as shown in this modification.

[0305] (The 6th modification) Drawing 45 is a typical explanatory view for explaining the 6th modification of this invention. In this modification, the description is open for free passage according to the ink supply path 1100 so that two ink stowage containers 1201 and 1202 which hold the ink of the same class may supply ink to the common nozzle of the ink jet head unit 160, respectively.

[0306] As shown in drawing 45 , when an electrode 270,290 is formed like each modification in the case of such a gestalt, these two tanks will be detected by coincidence with this ink detection means in the existence (or residue) of that ink. Drawing 46 (a) and (b) show an example of the detection result by the ink detection means.

[0307] In the case of an ink distribution system as shown in drawing 45 , ink may be preferentially drawn from the case where ink is generally drawn from the both sides of the ink stowage containers 1201 and 1202, and either. Ink consumption is typically shown for the maximum VH of an output wave when the **** pulse shown in drawing 28 (a) when the ink of one ink stowage container 1201 is consumed preferentially is added on an axis of abscissa by

drawing 46 (a). In drawing 46 (a), the sections c1, c2, and c3 are equivalent to the condition of drawing 46 (c1), (c2), and (c3), respectively. In the section c1, it is VH**V, and after becoming VH**V' in the section c2, it is VH**0 in the section c3. In the section c2, only the ink of one ink stowage container 1201 is consumed.
[0308] On the other hand, ink consumption is typically shown for the maximum VH of an output wave when the **** pulse shown in drawing 28 (a) when the ink of the both sides of the ink stowage containers 1201 and 1202 is consumed is added on an axis of abscissa by drawing 46 (b). In drawing 46 (b), the sections d1, d2, and d3 are equivalent to the condition of (d2) and (d3) shown in drawing 46 (d), respectively (d1). In the section d1, it is VH**V, and is VH**0 in the section d3. In this case, in the section d2, all of two ink stowage containers show the condition that ink is consumed mostly, and VH is changing rapidly.
[0309] Thus, since the electrode 290 is open for free passage with the liquid also to the ink stowage container 1201 and 1202 through the ink passage 1100 when supplying a common liquid with two or more containers, exchange of an ink tank can be ensured by comparing with a wave-like change when all the containers become empty.
[0310] Furthermore, when the ink stowage containers 1201 and 1202 are mutually disengageable and the value of V' continues for a while using an above-mentioned detection result, warning that one of ink stowage containers is empty is displayed on the control unit which controls a recording device and this recording device, and you may make it demand exchange from a user.
[0311] Moreover, when three liquid stowage containers are connected through the free passage way, when VH**2/3V continue for a while, any one of three containers can judge, respectively that any two of three containers became empty, when VH**1/3V follow empty for a while.
[0312] (The 7th modification) Drawing 47 is a typical explanatory view for explaining the 7th modification of this invention. the ratio of the area of the part which counters to the 6th above-mentioned modification in this modification to the container 1201 of the electrode 270 which counters the pars basilaris ossis occipitalis of two liquid stowage containers 1201 and 1202, and the area of the part which counters to a container 1202 — differing (in general 2:1 when it is this modification) — the points which have become differ.
[0313] In this modification, as shown in drawing 47, when an electrode 270,290 is formed like each modification, these two tanks will be detected by coincidence with this ink detection means in the existence (or residue) of that ink. Drawing 48 (a) and (b) show an example of the detection result by the ink detection means. Moreover, the condition of the liquid stowage containers 1201 and 1202 in the sections c1, c2, and c3 of drawing 48 (a) is shown in drawing 48 (c1), (c2), and (c3), respectively, and the condition of section c1' of drawing 48 (b) and the liquid stowage containers 1201 and 1202 in c2' and c3' is shown in drawing 48 (c1'), (c2'), and (c3'), respectively.

[0314] As shown in drawing 48 (a), when the ink in the small container 1202 of the opposed face product of a counterelectrode is consumed previously, in the section c2, VH**V' (**2/3V) is detected for a while. On the other hand, as shown in drawing 48 (b), when the ink of the large container 1201 of the opposed face product of a counterelectrode is consumed previously, in section c2', VH**V" (**1/3V) is detected for a while.
[0315] Therefore, in the case of this modification, when announcing to a user that the ink in one container disappeared from the detection result unlike the case of the 6th above-mentioned modification, it is possible to announce even about which container having even become empty.
[0316] in addition — although the above-mentioned modification explained in the case of two containers — the case of n tanks — the opposed face product ratio of an electrode — in general — 2n-1:2n-2:::20 (n>=3) — then, it is good. Moreover, although the opposed face product ratio of an electrode was changed in the above-mentioned modification, it is good also as a ratio of the distance at an electrode and the base of a tank.
[0317]
[Effect of the Invention] As explained above, according to this invention, the base of a liquid supply container can be made to be able to incline to a horizontal plane, or it can detect that the liquid residue decreased by transforming a liquid stowage with constituting from a member which can generate negative pressure using change of an opposed face product with the electrode of a

liquid when the liquid residue of a liquid supply container decreases. If a liquid supply container is exchanged at this time when a liquid supply container and a negative pressure generating member receipt room are disengageable, it is stabilized succeedingly and a liquid can be supplied to a negative pressure generating member receipt room from a liquid supply container.

[0318] Moreover, when the thickness of an adjoining liquid supply container and the side attachment wall which counters makes thickness of the wall surface of a liquid supply container (liquid stowage) larger than the thickness of an electrode and the bottom wall which counters, effect of the electrostatic capacity generated between adjoining liquid supply containers can be lessened. Consequently, the residue of the liquid in the target liquid supply container can be detected with a more sufficient precision, it is stabilized and supply outside of a liquid can be performed.

[0319] Moreover, by having fragmentation structure in the electrode for liquid residue detection of a liquid supply container (liquid stowage), and the bottom wall which counters, even when a liquid remains in a bottom wall in the shape of film, the residue of a liquid can be detected certainly, as a result, it is stabilized and supply outside of a liquid can be performed.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the ink jet head cartlidge which is one operation gestalt of this invention.
[Drawing 2] It is the sectional view of the cartridge of drawing 1 .
[Drawing 3] It is a perspective view for explaining the ink tank unit shown in drawing 2 .
[Drawing 4] It is a sectional view for explaining the actuation which equips with an ink tank unit the electrode holder with which the negative pressure control room unit of drawing 2 was attached.
[Drawing 5] It is a sectional view for explaining the switching action of a valve system applicable to this invention.
[Drawing 6] It is a sectional view for explaining supply actuation of the ink in the ink jet head cartlidge shown in drawing 2 .
[Drawing 7] It is drawing for explaining the condition of the ink in the ink consumption actuation explained based on drawing 6 .
[Drawing 8] It is drawing for the ink consumption actuation explained based on drawing 6 to explain the depressor effect of the internal pressure fluctuation by deformation of a PE liner.
[Drawing 9] It is drawing showing the relation of the valve yoke and valve element in a valve system applicable to this invention.
[Drawing 10] It is the perspective view showing an example of the configuration of the point of the joint pipe engaged at the time of the switching action of a valve system applicable to this invention.
[Drawing 11] It is drawing showing the example of a gestalt for comparing with a valve system applicable to this invention.
[Drawing 12] It is drawing showing the condition in the valve system of drawing 11 of becoming complicated.
[Drawing 13] It is drawing showing the seal condition in the valve system of drawing 11 .
[Drawing 14] It is drawing showing a valve system applicable to this invention.
[Drawing 15] It is drawing showing the condition in the valve system of drawing 14 of becoming complicated.
[Drawing 16] It is drawing showing the seal condition in the valve system of drawing 14 .
[Drawing 17] It is drawing for explaining an engagement configuration with the joint pipe point of the valve element in the valve system of drawing 14 .
[Drawing 18] It is drawing for explaining the manufacture approach of an ink tank applicable to this invention.
[Drawing 19] It is the sectional view showing the example of an internal configuration of the ink stowage container shown in drawing 2 .
[Drawing 20] It is drawing for explaining the absorber in the negative pressure control room container shown in drawing 2 .
[Drawing 21] It is drawing for explaining the absorber in the negative pressure control room container shown in drawing 2 .
[Drawing 22] It is drawing for explaining the attachment-and-detachment actuation by rotation

of the ink tank unit shown in drawing 2 .
[Drawing 23] It is the approximate account Fig. of an ink jet head cartlidge using an ink tank unit applicable to this invention.
[Drawing 24] It is drawing showing the outline configuration of the recording device which can apply the ink jet head cartlidge of this invention.
[Drawing 25] It is drawing for explaining the dimension of the component part of the connection place of an ink tank unit applicable to this invention.
[Drawing 26] It is the sectional view of an ink jet head unit shown in drawing 2 .
[Drawing 27] They are two inter-electrode representative circuit schematics shown in drawing 2 .
[Drawing 28] It is drawing showing the impression pulse at the time of the ink residue detection in an ink tank unit, and an output wave.
[Drawing 29] It is the sectional view of the ink jet cartridge of the 1st modification of this invention.
[Drawing 30] It is the sectional view of the ink jet cartridge of the 2nd modification of this invention.
[Drawing 31] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 32] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 33] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 34] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 35] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 36] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 37] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 38] It is the sectional view of the ink jet cartridge explaining the 3rd modification of this invention.
[Drawing 39] It is the sectional view of the ink jet cartridge explaining the 4th modification of this invention.
[Drawing 40] It is the sectional view of the ink jet cartridge explaining the further modification of the 4th modification of this invention.
[Drawing 41] It is the explanatory view showing an example of the equal circuit of the ink residue detection system in the condition that two or more ink stowage containers adjoined mutually, and have been arranged.
[Drawing 42] It is drawing showing some examples of modification of the cross-section configuration of the cross direction of an ink stowage container.
[Drawing 43] It is the sectional view of the ink jet cartridge explaining the 5th modification of this invention.
[Drawing 44] It is a fragmentary sectional view for explaining near the tank endite of the ink stowage container of the 5th modification of this invention.
[Drawing 45] It is an explanatory view for explaining the 6th modification of this invention.
[Drawing 46] It is drawing showing the example of the ink detection result in the modification shown in drawing 45 , and the condition of the ink stowage container in the condition.
[Drawing 47] It is an explanatory view for explaining the 7th modification of this invention.
[Drawing 48] It is drawing showing the example of the ink detection result in the modification shown in drawing 47 , and the condition of the ink stowage container in the condition.
[Description of Notations]
21 Fiber
70 Ink Jet Head Cartlidge

81 Carriage
82 Head Recovery Unit
83 Feed Side
84 Belt
100 Negative Pressure Control Room Unit
102 Sealing Surface
110 Negative Pressure Control Room Container
113c Interface
115 Atmospheric-Air Free Passage Opening
116 Buffer Space
120 Negative Pressure Control Room Lid
121 Guide Section
130,140 Absorber
131 Feed Hopper
150 Electrode Holder
151 Pars Basilaris Ossis Occipitalis
155 Ink Tank Stop Section
160 Ink Jet Head Unit
161 Filter
162 Ink Passage
164 Common Liquid Room
165 Ink Supply Pipe
170 ID Member
180 Joint Pipe
180a The projection for seals
180b The projection for valve-opening close
181a Top opening
181b Bottom opening
200 Ink Tank Unit
201 Ink Stowage Container
210 Case
210a Engagement section
211a, 211b Contact surface
220 PE Liner
221 Pinch-off Section
221a PE liner outcrop
222 Open Air Free Passage Opening
230 Joint Opening
250 ID Member
250a Click section
251 Inclined Plane
252 Crevice for ID
253 Engagement Hole
260 Joint-Seal Side
260a The 1st valve yoke
260b The 2nd valve yoke
260c Opening
261 Valve Element
262 Operculum
262a Operculum joining guide
262b R section
263 Energization Member
264 1st Valve-Yoke Seal Section
265 Valve Element Seal Section

266 Path Clearance
267 Elastomer
268 Valve Element Flange
270,290 Electrode
280 GOMUMU Joint Section
281 Connection Terminal
300,401 Ink
400 Joining Horn
402 Ink Impregnation Nozzle
510 Engagement Heights
511 Engagement Crevice
512 Pinch-off
513 Pawl
514 Rib Hole
550 Engagement Arrow-Head Section
551 Engagement Slit
552 Engagement Shaft
553 Engagement Hole
554 Engagement Rail Slot
555 Engagement Rail
600 Center of Rotation
601 Ink Tank Unit Stop Section Upper Limit
602 Ink Tank Unit Stop Section Lower Limit
603 Ink Feed Hopper Core Quantity
L Gas-liquid interface

[Translation done.]

* NOTICES *

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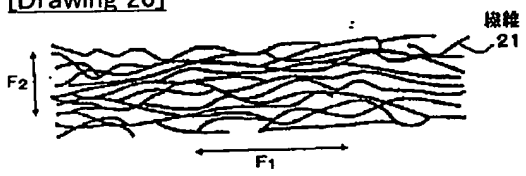
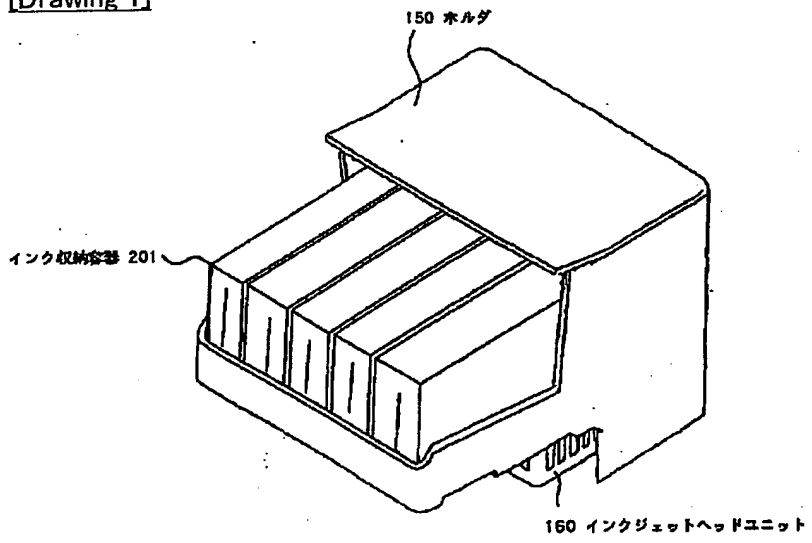
3.In the drawings, any words are not translated.

DRAWINGS

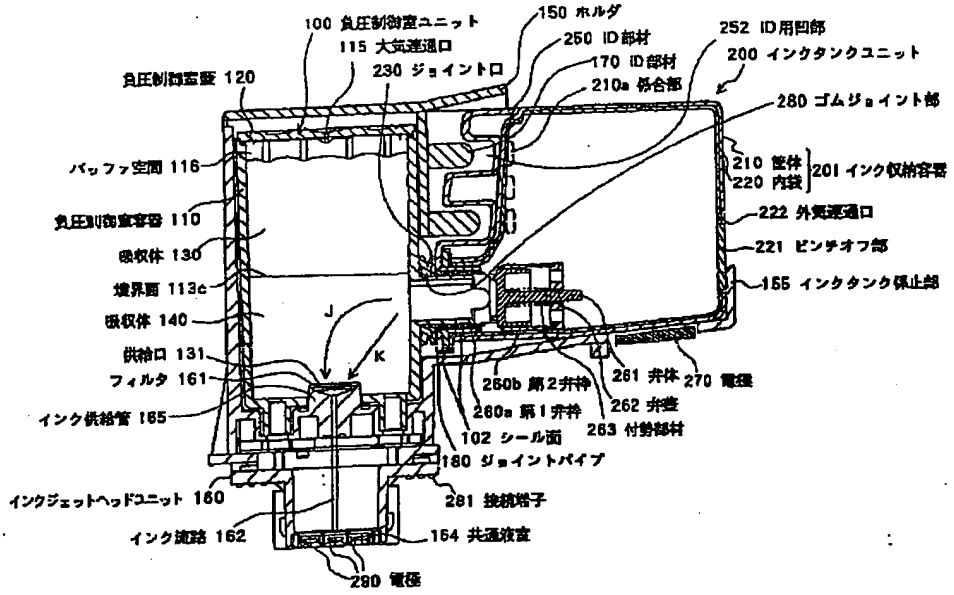
[Drawing 20]



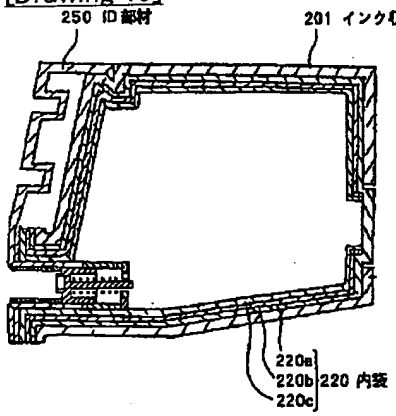
[Drawing 1]



[Drawing 2]



[Drawing 19]



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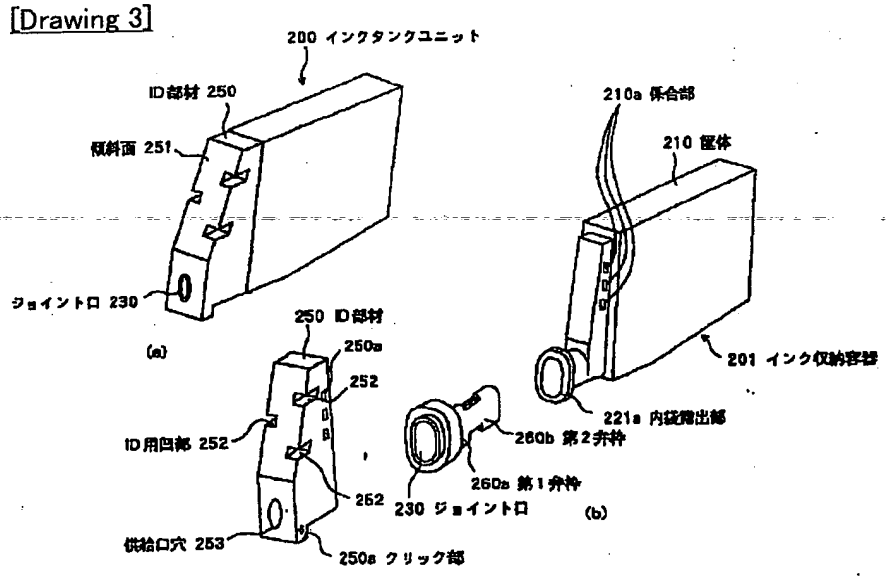

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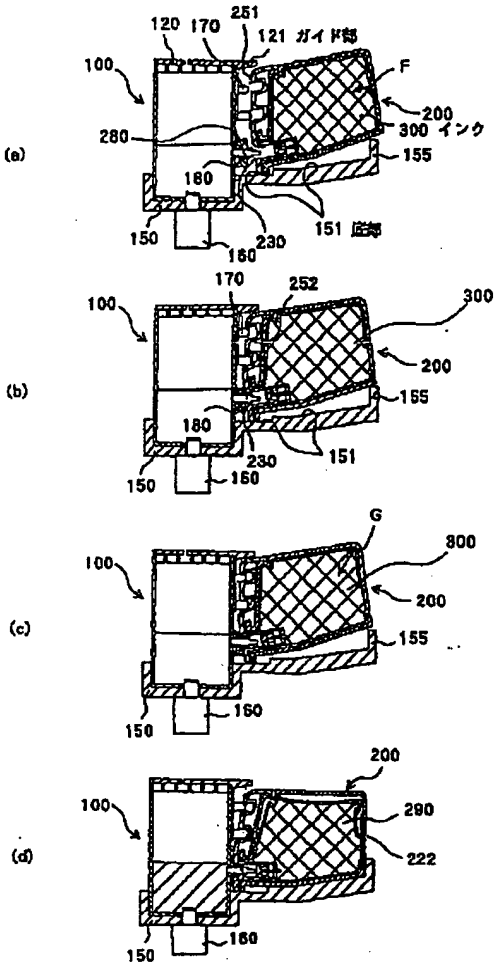
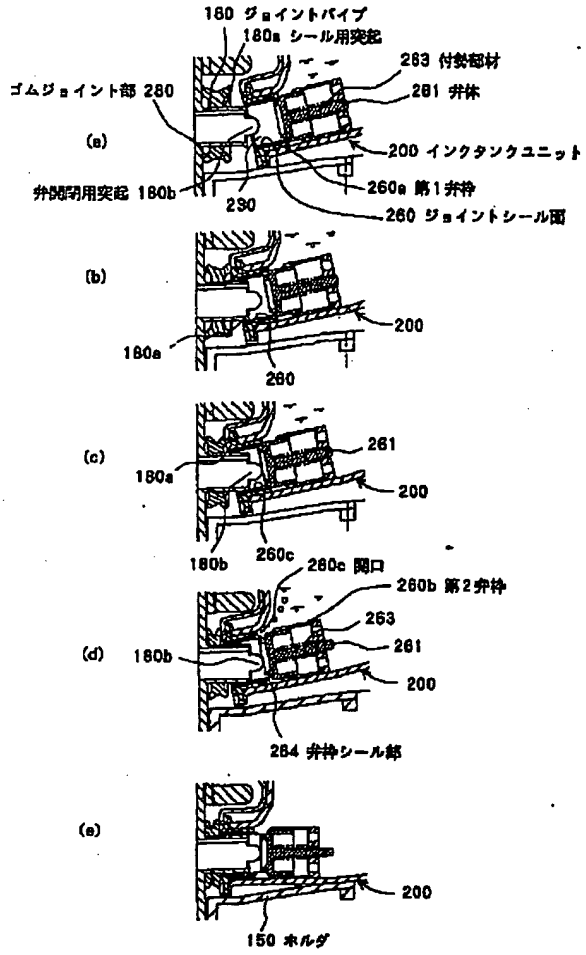
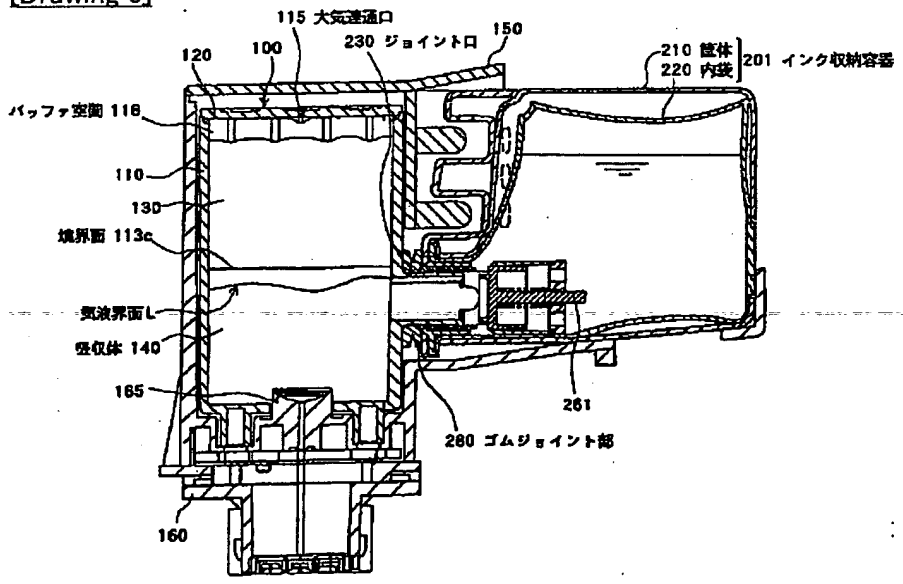

(a)
120
170
251
121 ガイド部
100
F
200
300 インク
280
155
180
150
230
151 底面
160
(b)
170
252
300
100
200
155
180
230
151
150
160
(c)
G
300
100
200
155
160
150
(d)
200
100
290
222
160
150

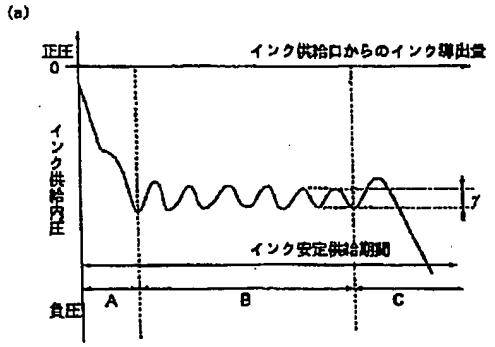
[Drawing 5]

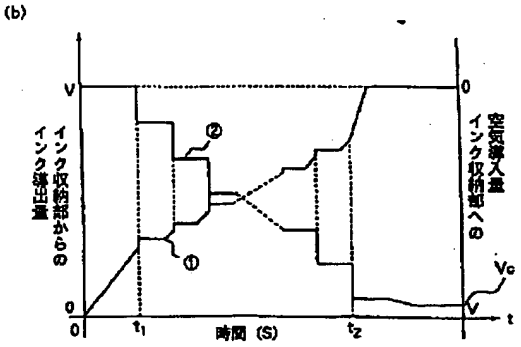


[Drawing 6]



[Drawing 7]





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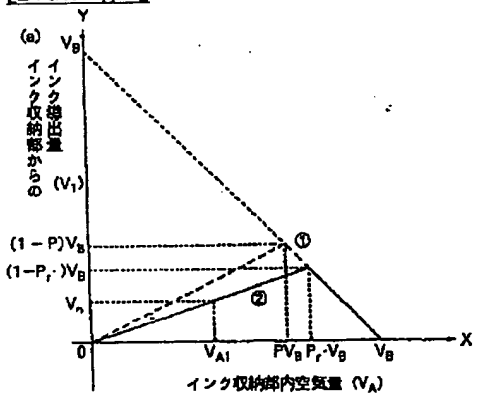

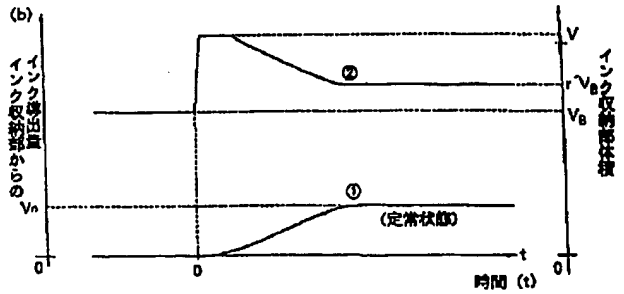

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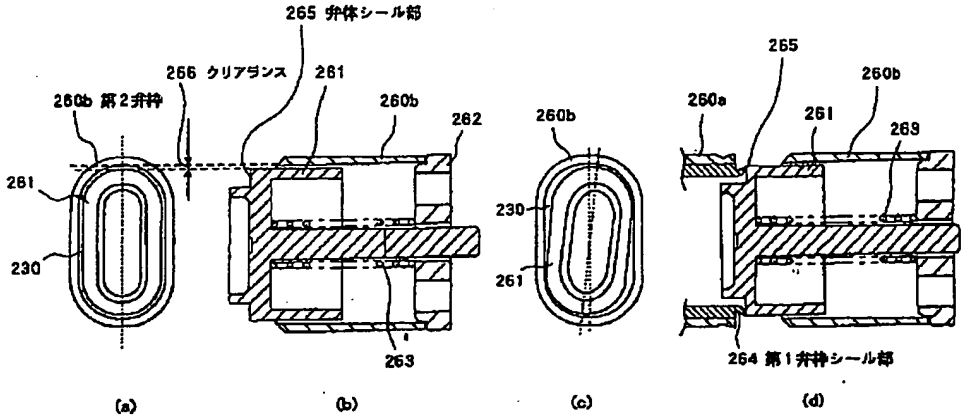

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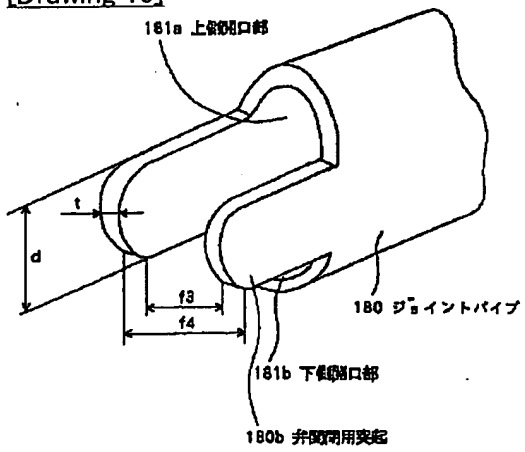
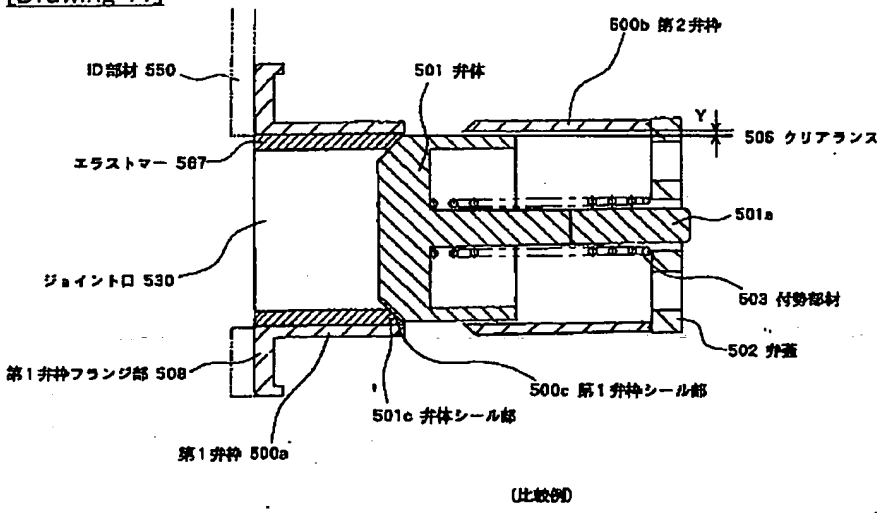
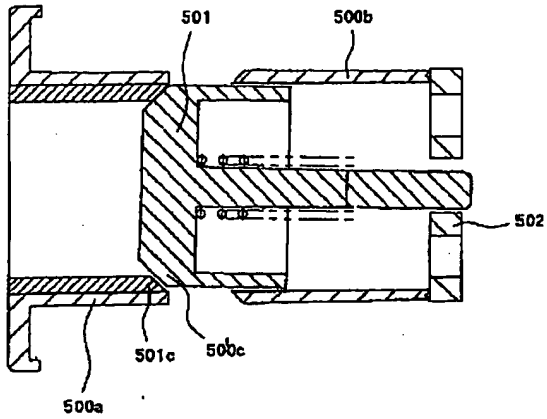


[Drawing 11]



(比較例)

[Drawing 13]



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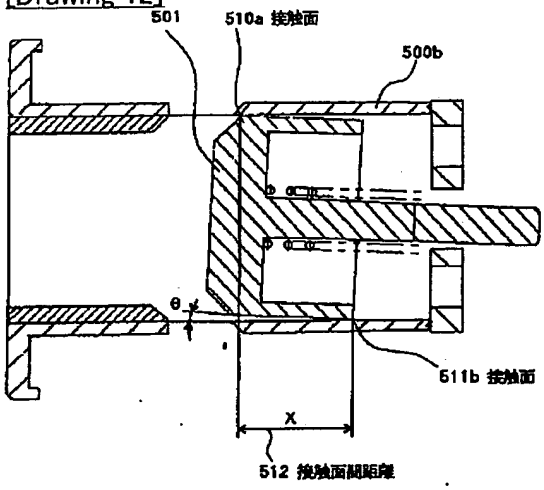
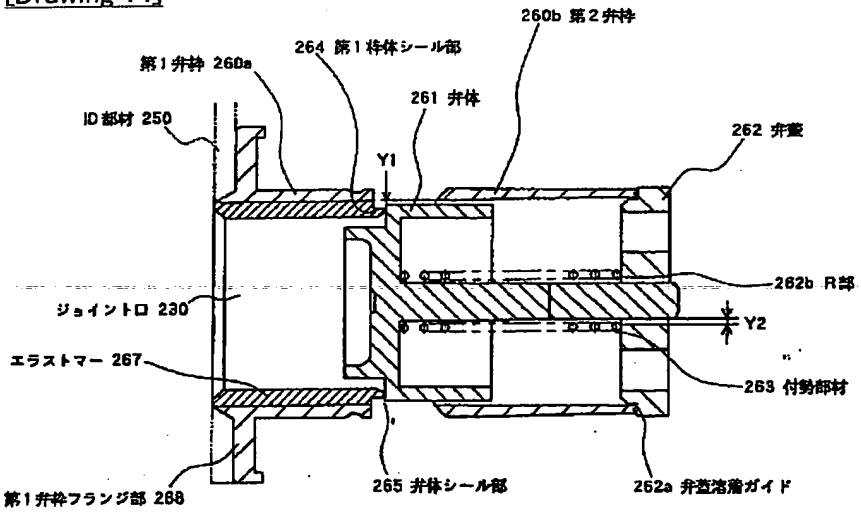


[Drawing 14]



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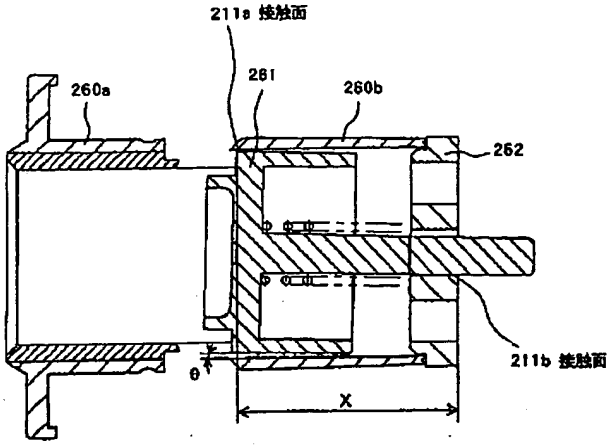

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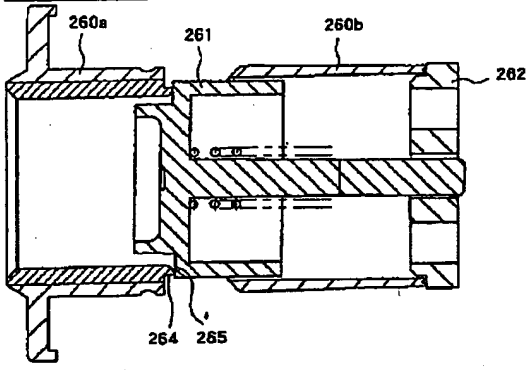

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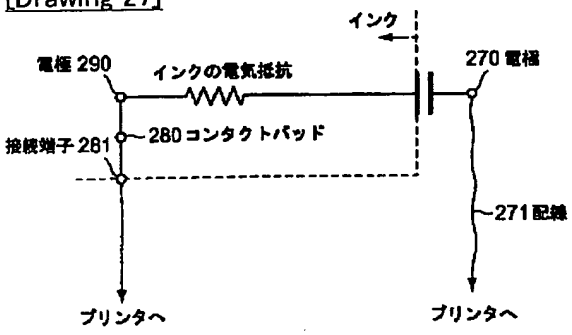

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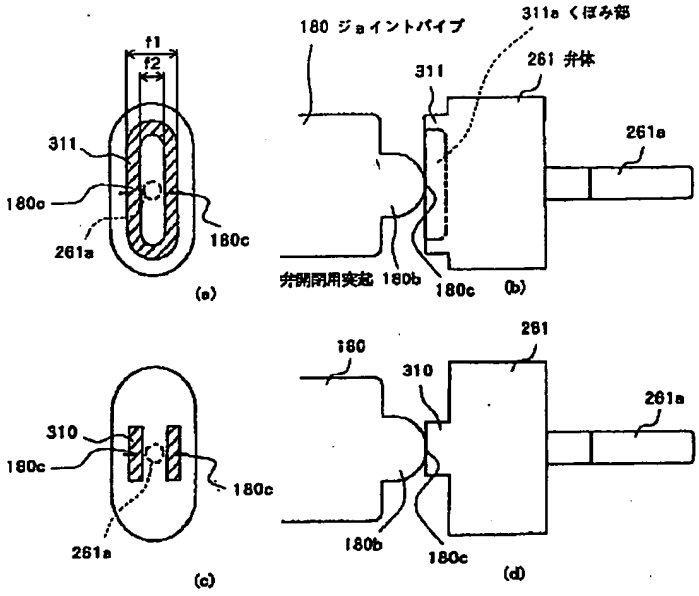

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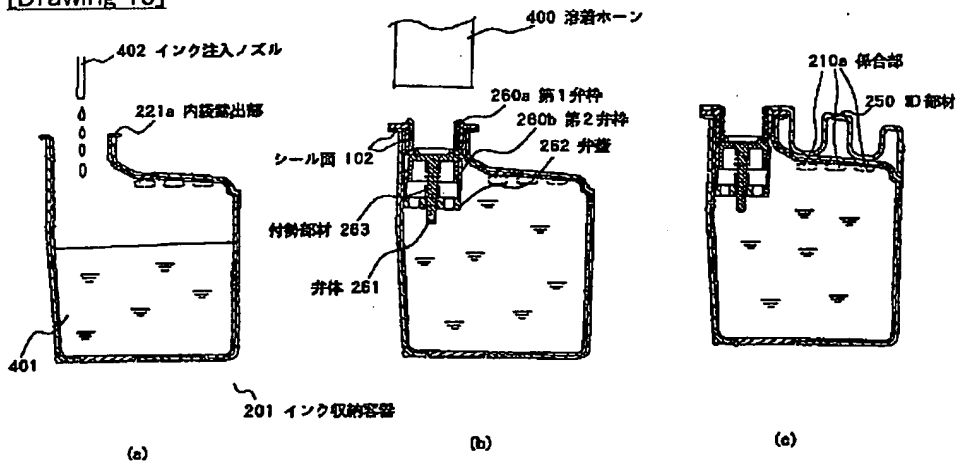
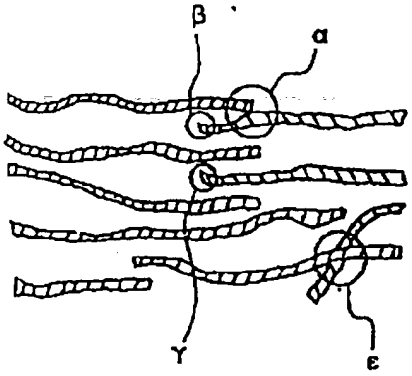
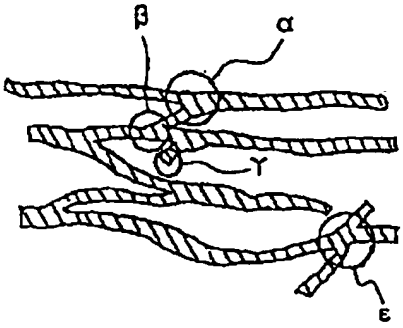


[Drawing 21]

(a)



(b)



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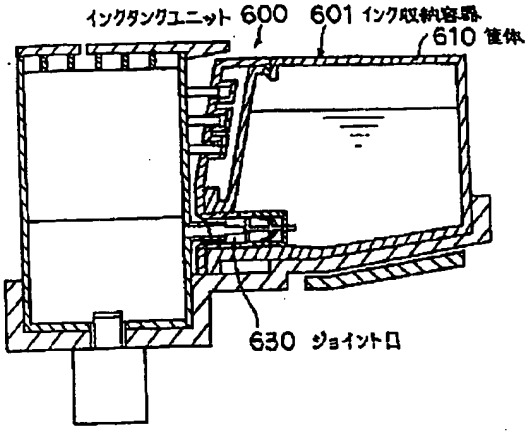

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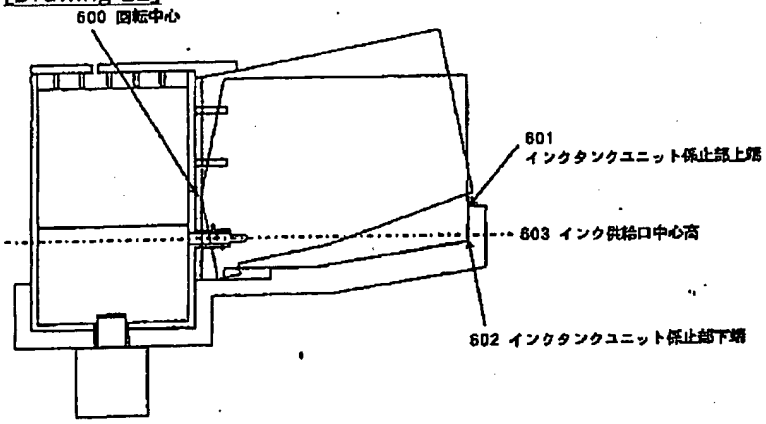

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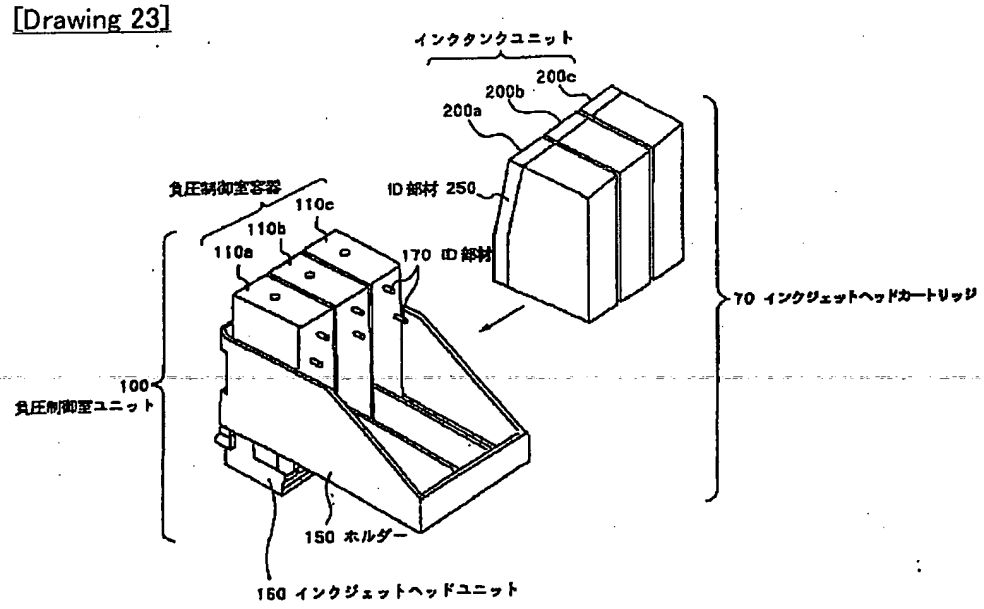

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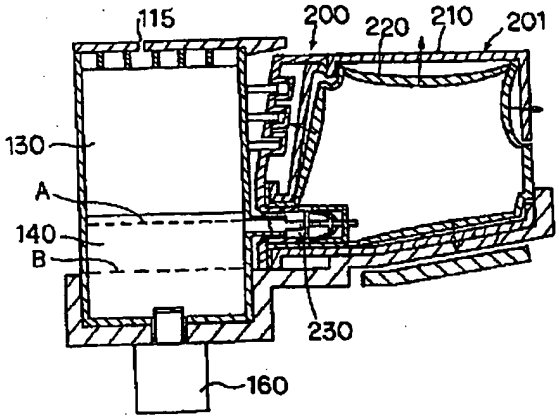

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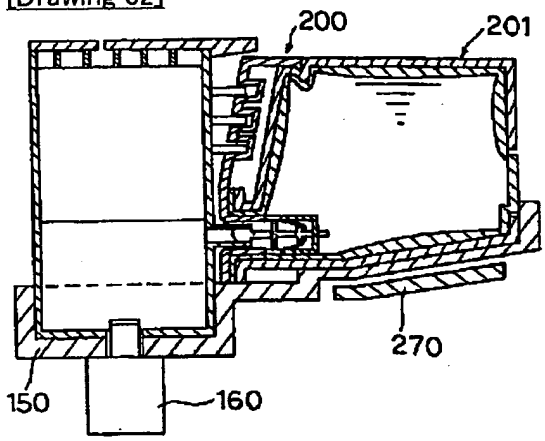

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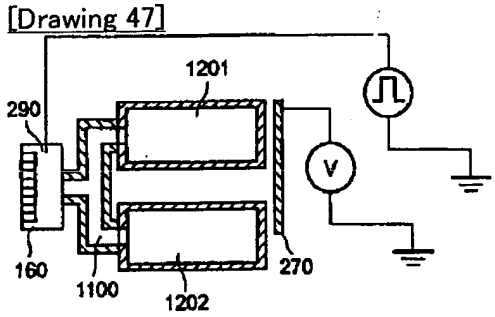

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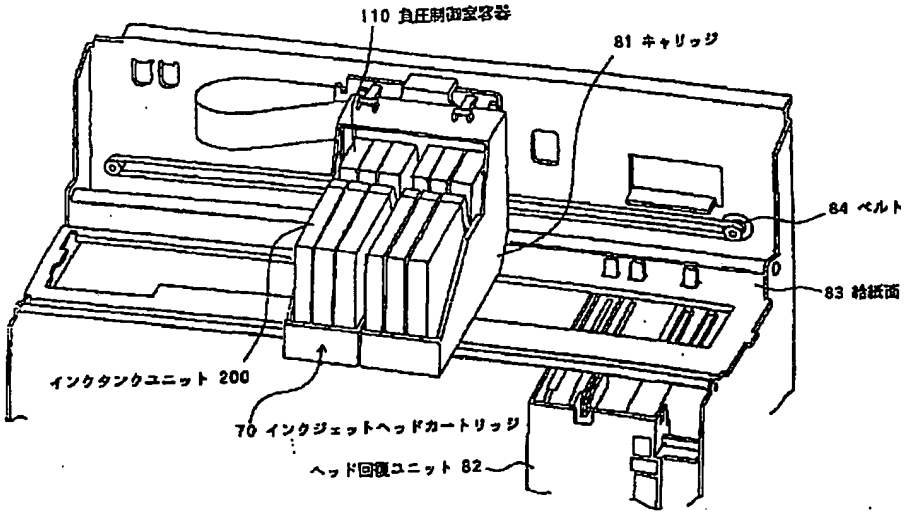
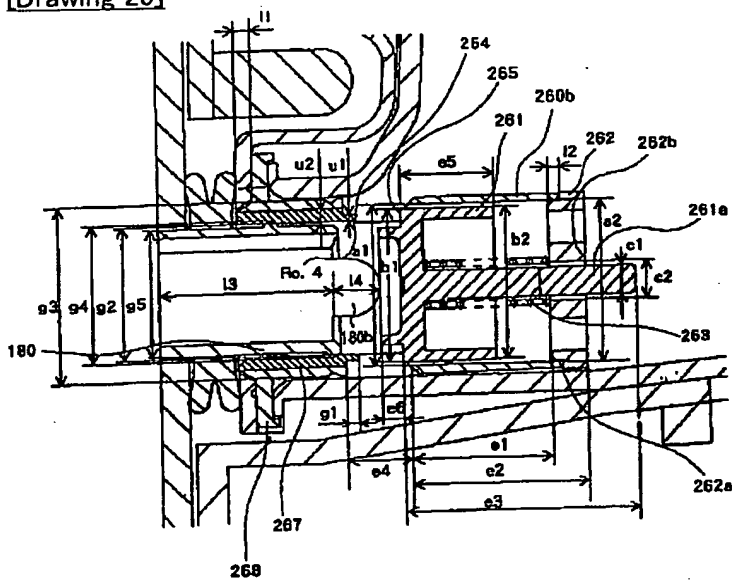
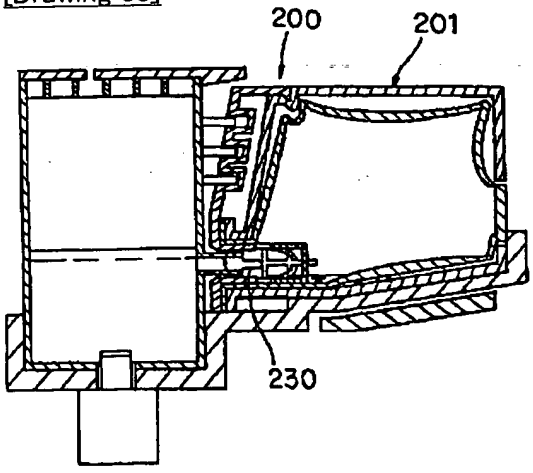


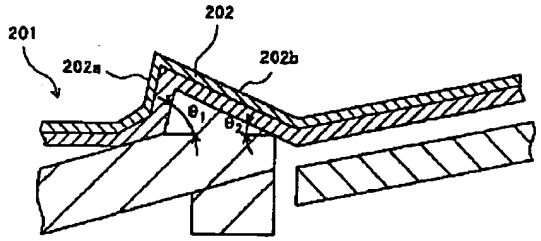
[Drawing 25]



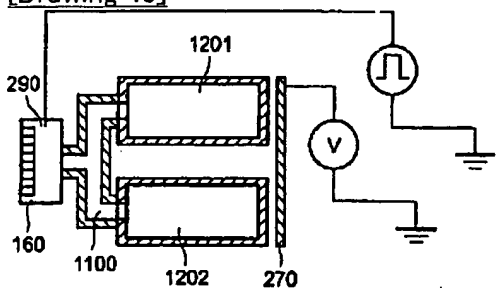
[Drawing 38]



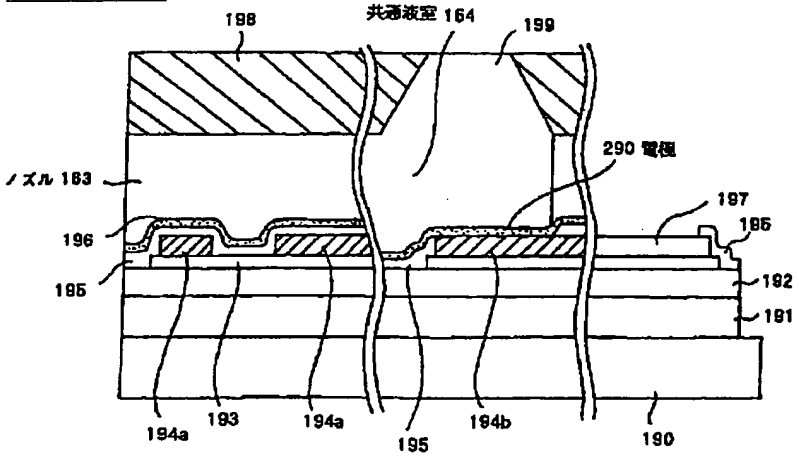
[Drawing 44]



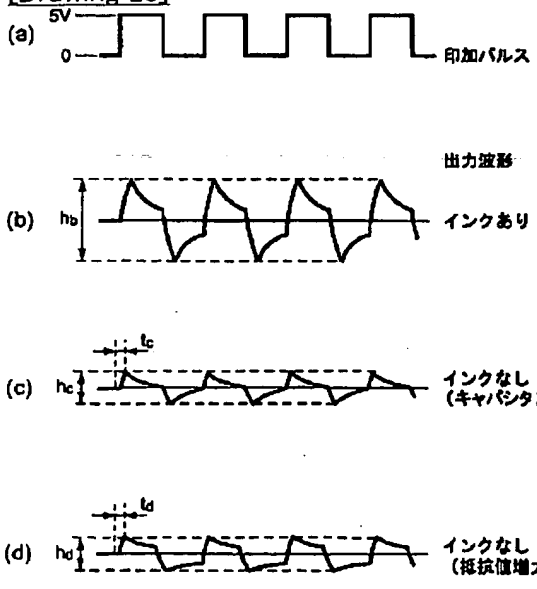
[Drawing 45]



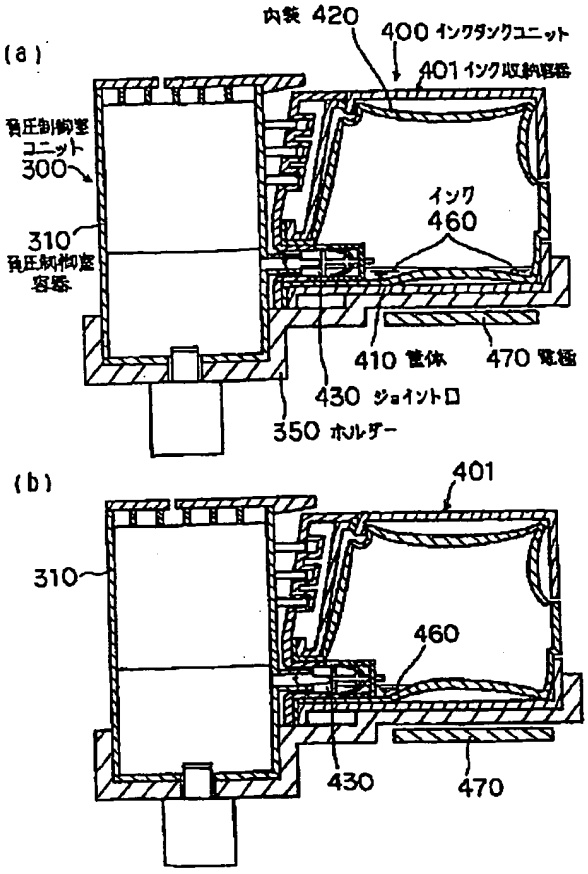
[Drawing 26]



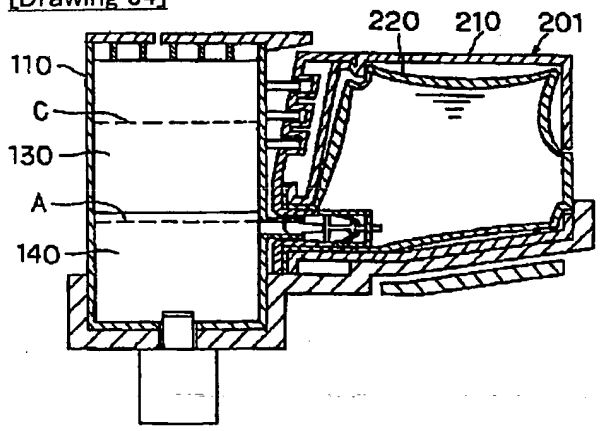
[Drawing 28]



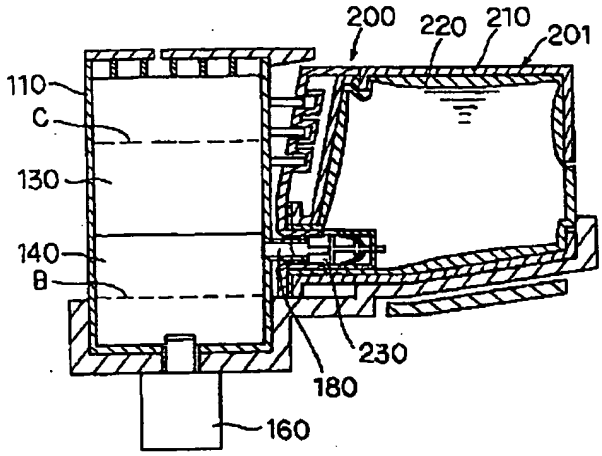
[Drawing 29]



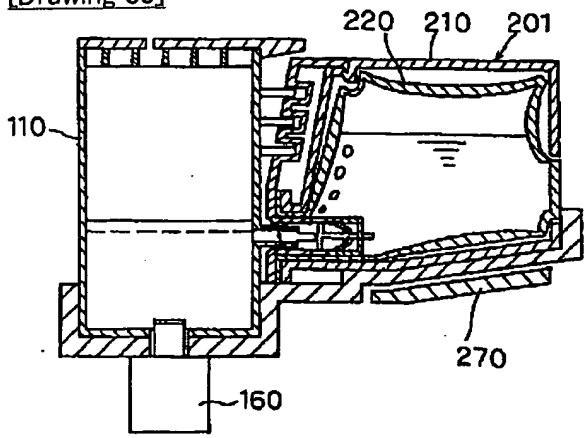
[Drawing 34]



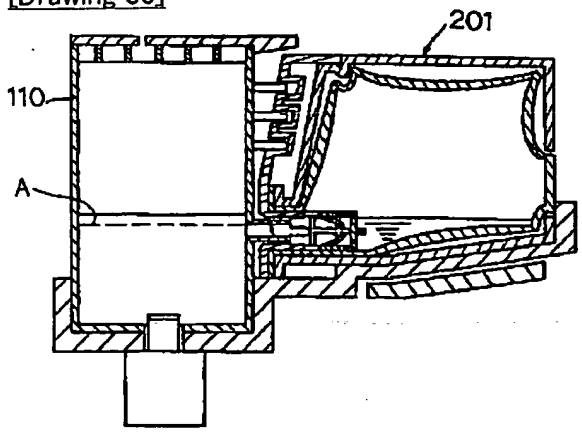
[Drawing 33]



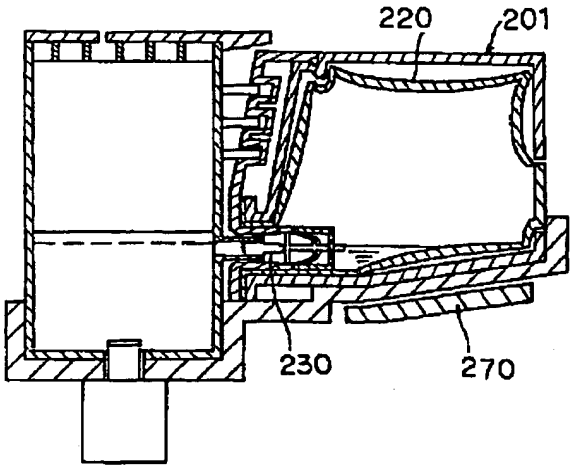
[Drawing 35]



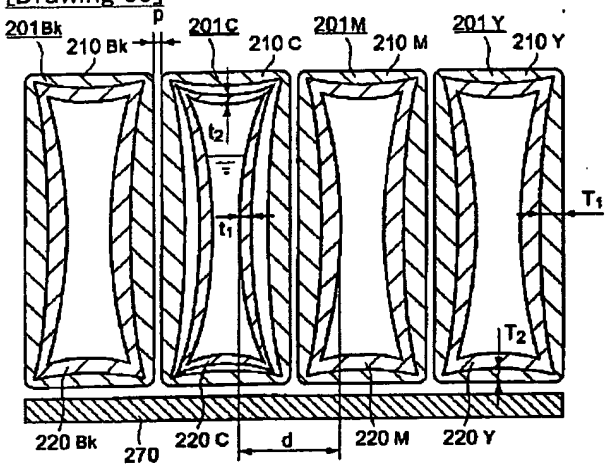
[Drawing 36]



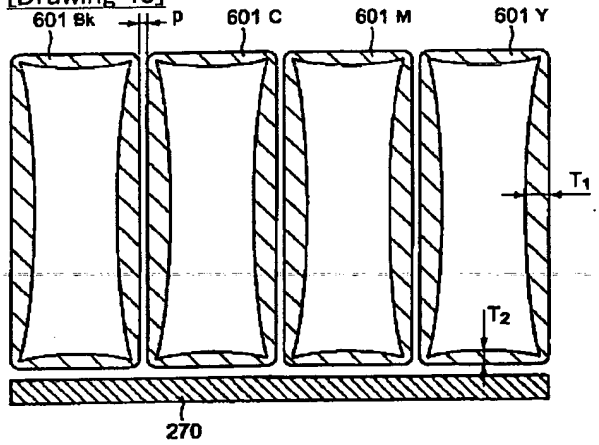
[Drawing 37]



[Drawing 39]

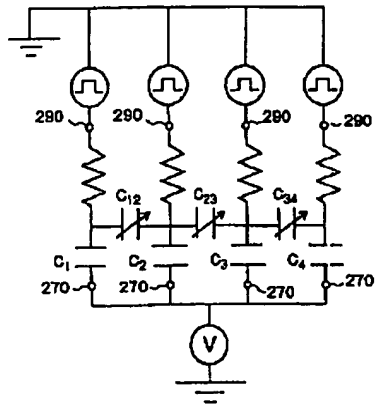


[Drawing 40]

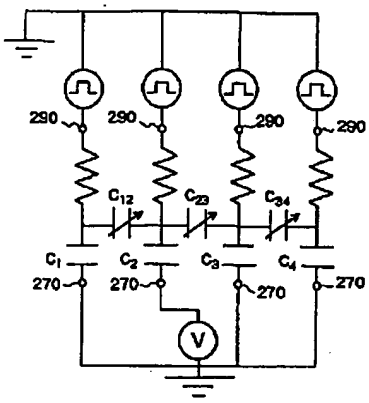


[Drawing 41]

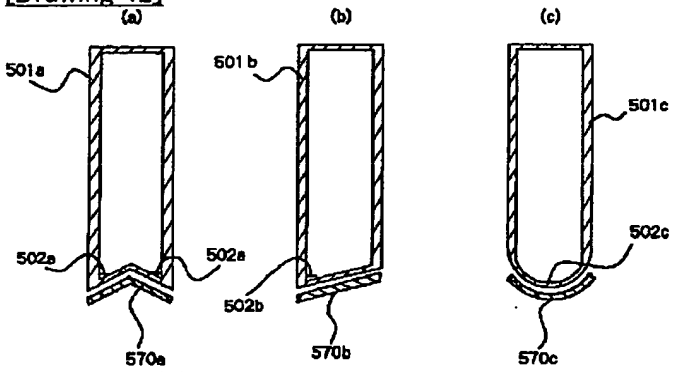
(a)



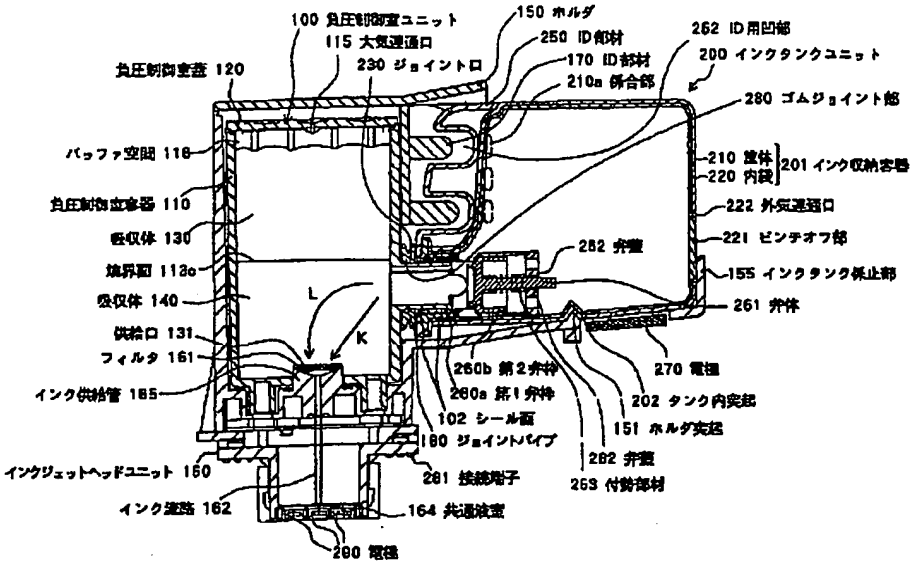
(b)



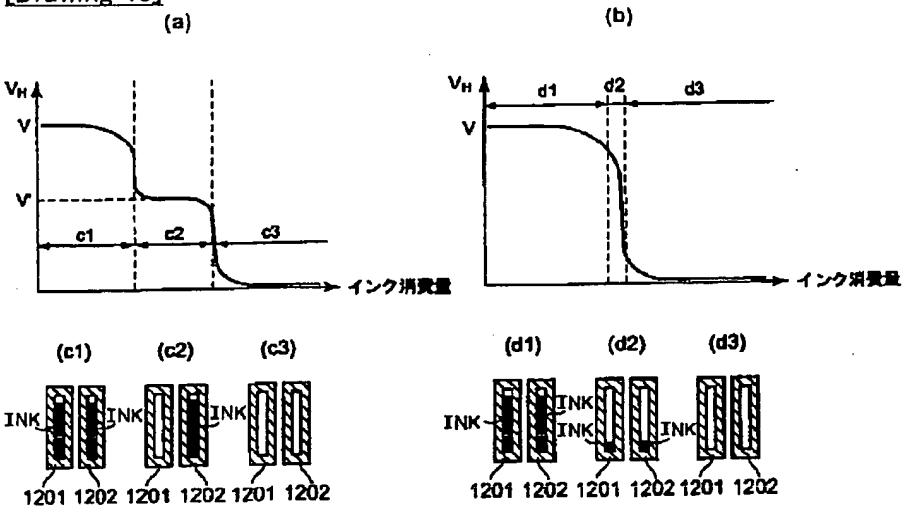
[Drawing 42]



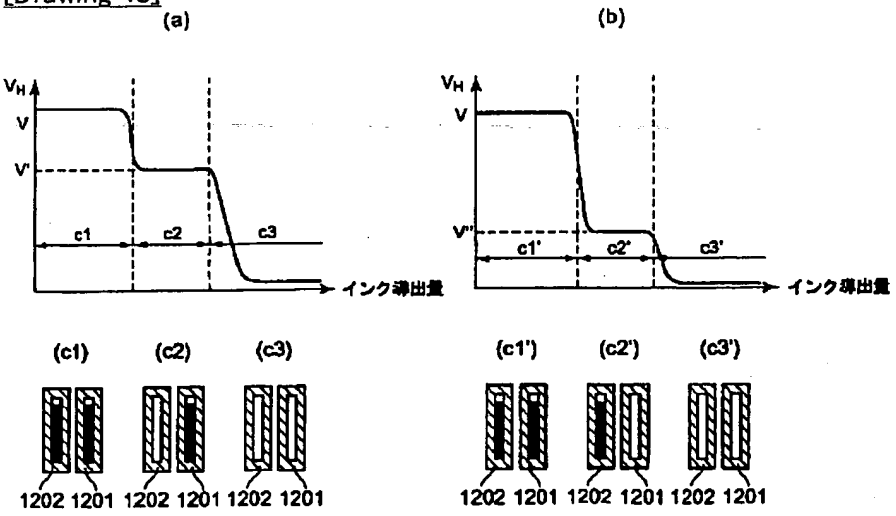
[Drawing 43]



[Drawing 46]



[Drawing 48]



[Translation done.]